LANTRONIX®


# PremierWave® XN
# User Guide

**Part Number 900-606**
**Revision B January 2013**

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## Warranty

For details on the Lantronix warranty policy, please go to our web site at www.lantronix.com/support/warranty.

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## Disclaimer

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

## Revision History

| Date | Rev. | Comments |
|---|---|---|
| February 2012 | A | Initial Document for firmware release 7.3.0.0. |
| January 2013 | B | Updated pinout and LED information. |

# Table of Contents

## 11: Maintenance and Diagnostics Settings 73

# List of Figures

# List of Tables

# 1: Using This Guide

## Purpose and Audience

This guide provides the information needed to configure, use, and update the PremierWave XN. It is intended for software developers and system integrators who are installing this product into their designs.

## Summary of Chapters

The remaining chapters in this guide include:

| Chapter | Description |
|---|---|
| *2: Introduction* | Main features of the product and the protocols it supports. Includes technical specifications. |
| *3: Installation of PremierWave XN* | Instructions for installing the PremierWave XN. |
| *4: Using DeviceInstaller* | Instructions for viewing the current configuration using DeviceInstaller. |
| *5: Configuration Using Web Manager* | Instructions for accessing Web Manager and using it to configure settings for the device. |
| *6: Network Settings* | Instructions for configuring network settings. |
| *7: Line and Tunnel Settings* | Instructions for configuring line and tunnel settings. |
| *8: Terminal and Host Settings* | Instructions for configuring terminal and host settings. |
| *9: Services Settings* | Instructions for configuring DNS, FTP, HTTP and Syslog settings. |
| *10: Security Settings* | Instructions for configuring SSL security settings. |
| *11: Maintenance and Diagnostics Settings* | Instructions to maintain the PremierWave, view statistics, files, and diagnose problems. |
| *12: Advanced Settings* | Instructions for configuring email, CLI and XML settings. |
| *13: Bridging* | Instructions for bridging configuration. |
| *14: Security in Detail* | Provides additional information on security settings available. |
| *15: Updating Firmware* | Instructions for obtaining the latest firmware and updating the PremierWave. |
| *16: VIP Settings* | Information about Virtual IP (VIP) features available on the device and instructions on configuring settings. |
| *17: Branding the PremierWave XN* | Instructions on how to brand your device. |
| *Appendix A: Technical Support* | Instructions for contacting Lantronix Technical Support. |
| *Appendix B: Binary to Hexadecimal Conversions* | Instructions for converting binary values to hexadecimals. |
| *Appendix C: Compliance* | Lantronix compliance information. |

## Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

| Document | Description |
|---|---|
| **PremierWave XN Command Reference** | Instructions for accessing Command Mode (the command line interface) using a Telnet connection, SSH connection or through the serial port. Detailed information about the commands. Also provides details for XML configuration and status. |
| **PremierWave XN Quick Start Guide** | Instructions for getting the PremierWave up and running. |
| **DeviceInstaller Online Help** | Instructions for using the Lantronix Windows-based utility to locate the PremierWave and to view its current settings. |
| **Com Port Redirector Quick Start and Online Help** | Instructions for using the Lantronix Windows-based utility to create virtual com ports. |

# 2: Introduction

PremierWave XN is a multi-port device server offering high performance, Ethernet-to-wireless bridging connectivity that allows remote access and easy management of machines or equipment over the network and across the internet. PremierWave XN provides bullet-proof security by offering robust data encryption and authentication options including AES, SSH and SSL. Remote configuration over a network is possible using Telnet, SSH, or web browser (HTTP and HTTPS).

## Key Features

- **Power Supply:** Flexible power options and input voltage range (one barrel connector for 12V power supply, on terminal block connector for 09-30Vdc power supply).
- **Controller:** 32-bit ARM9 microprocessor running at 400 megahertz (Mhz) with 32 KB Data Cache and 32 Kilobytes (KB) internally based around the PremierWave EN.
- **Memory:** 64 MB SDRAM, 64 MB NAND Flash, and 8 MB serial SPI Flash.
- **Ethernet:** Wired 802.3 Ethernet networking
- **Wireless:** 802.11 a/b/g/n wireless networking
- **Serial Ports:** Two 300 to 921 kbaud, RS-232/422/485 serial ports
- **USB Ports:** Two USB 2.0 full speed interfaces
- Configuration via CLI, XML and HTTP
- Ethernet to wireless tunneling
- Lantronix SmartRoam technology
- Built-in site survey tool
- **Temperature Range:** Operates over a temperature range of -40°C to +70°C (-40°F to 158°F). The storage temperature range is -40°C to 85°C (-40°F to 185°F).

## Applications

The PremierWave XN device server connects serial devices such as those listed below to Ethernet networks using the IP protocol family.

- Patient Monitoring Devices
- Glucose Analyzers
- Infusion Pumps

## Protocol Support

The PremierWave XN device server contains a full-featured IP stack. Supported protocols include:

- ARP, UDP, TCP, ICMP,DHCP, Auto IP, Telnet, DNS, FTP, TFTP, SSH, SSL and Syslog for network communications and management.

- TCP, UDP, SSH, SSL and telnet tunneling to the serial port.
- TFTP for uploading/downloading files.
- FTP and HTTP for firmware upgrades and uploading/downloading files.

## Troubleshooting Capabilities

The PremierWave XN offers a comprehensive diagnostic toolset that lets you troubleshoot problems quickly and easily. Available from the CLI or Web Manager, the diagnostic tools let you:

- View memory and IP socket information.
- Perform ping and traceroute operations.
- Conduct forward or reverse DNS lookup operations.
- View all processes currently running on the PremierWave XN, including CPU utilization.
- View system log messages.

## Configuration Methods

After installation, the PremierWave XN requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. There are four basic methods for logging into the PremierWave XN and assigning IP addresses and other configurable settings:

- **Web Manager**: View and configure all settings easily through a web browser using the Lantronix Web Manager. (*See "Configuration Using Web Manager" on page 27.*)
- **DeviceInstaller**: Configure the IP address and related settings and view current settings on the PremierWave XN using a Graphical User Interface (GUI) on a PC attached to a network. You will need the latest version of DeviceInstaller. (*See "Using DeviceInstaller" on page 25.*)
- **Command Mode:** There are two methods for accessing Command Mode (CLI): making a Telnet or SSH connection, or connecting a terminal (or a PC running a terminal emulation program) to the unit's serial port. (See the *PremierWave XN Command Reference Guide* for instructions and available commands.)
- **XML:** The PremierWave XN supports XML-based configuration and setup records that make device configuration transparent to users and administrators. XML is easily editable with a standard text or XML editor. (See the *PremierWave XN Command Reference Guide* for instructions and commands.)

## Addresses and Port Numbers

### Hardware Address

The hardware address is also referred to as the Ethernet address, physical address, or MAC address. Sample hardware address:

- `00-80-A3-14-1B-18`
- `00:80:A3:14:1B:18`

### IP Address

Every device connected to an IP network must have a unique IP address. This address references the specific unit.

### Port Numbers

Every TCP connection and every UDP datagram is defined by a destination and source IP address, and a destination and source port number. For example, a Telnet server commonly uses TCP port number 23.

The following is a list of the default server port numbers running on the :

- TCP Port 22: SSH Server (Command Mode configuration)
- TCP Port 23: Telnet Server (Command Mode configuration)
- TCP Port 80: HTTP (Web Manager configuration)
- TCP Port 21: FTP
- UDP Port 30718: LDP (Lantronix Discovery Protocol) port
- TCP/UDP Port 10001: Tunnel 1 (see note below)

***Note:*** *Additional TCP/UDP ports and tunnels will be available, depending on the product type. The default numbering of each additional TCP/UDP port and corresponding tunnel will increase sequentially (i.e., TCP/UDP Port 1000X: Tunnel X).*

## Product Information Label

The product information label on the unit contains the following information about the specific unit:

- Bar code
- Product Revision
- Part Number
- Serial Number (MAC Address)
- Manufacturing Date Code

***Note:*** *The hardware address on the label is also the product serial number. The hardware address on the label is the address for the Ethernet (eth0) interface. The WLAN (wlan0) interface uses the Ethernet address "+1". For example, if the product label hardware address is 00-80-A3-14-1B-18, then the Ethernet address is 00-80-A3-14-1B-18 and the WLAN address is 00-80-A3-14-1B-19.*

**Figure 2-1 PremierWave XN Product Label**

# 3: Installation of PremierWave XN

This chapter describes how to install the PremierWave XN device server. It contains the following sections:



## Package Contents

The PremierWave XN package includes the following items:

- One PremierWave XN device
- One Power Supply 12 VDC with international adapters
- Two External Antenna, RPSMA Connector
- One RJ-45 Ethernet Straight Cat5 Cable, 1.5 meter
- Quick Start Guide

## User-Supplied Items

To complete your installation, you need the following items:

- RS-232/422/485 serial devices that require network connectivity.
- A serial cable, as listed below, for each serial device. One end of the cable must have a female DB9 connector for the serial port.
  - A null modem cable to connect the serial port to another DTE device.
  - A straight-through modem cable to connect the serial port to a DCE device.
- An available connection to your Ethernet network and an Ethernet cable.
- A working AC power outlet if the unit will be powered from an AC power adapter.

## Hardware Components

### Front/Top Panel

*Figure 3-1* shows the top panel view of the PremierWave XN. *Table 3-6*, *Table 3-7*, *Table 3-8*, *Table 3-9* and *Table 3-10* list and explain the behavior of the LEDs on the top panel.

**Figure 3-1 PremierWave XN Top View**


The PremierWave XN has two male DB9 serial ports that support RS-232/422/485. *Figure 3-2* shows the front view of the device. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.

**Figure 3-2 PremierWave XN Male DB9 DTE Serial Ports**

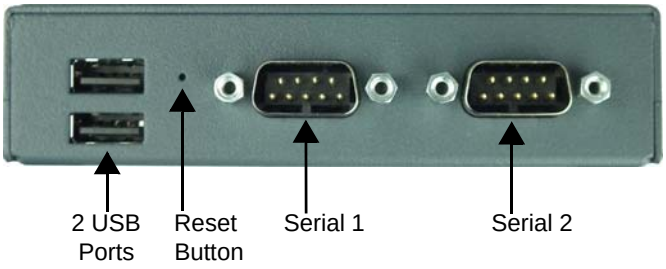



**Figure 3-3 PremierWave XN Pinout Configuration for RS-232**

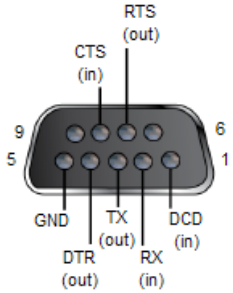


**Figure 3-4 PremierWave XN Pinout Configuration for Full Duplex RS-422/485 (4-wire)**

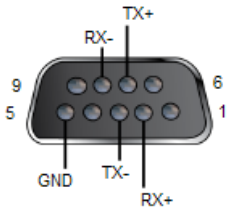
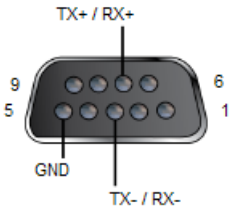



**Figure 3-5 PremierWave XN Pinout Configuration for Half Duplex RS-422/485 (2-wire)**




### *Ethernet LEDs*

The Ethernet Port has two LEDs that indicate the status of the connection as follows:

**Left LED**

- Green ON 100Mbps Link
- Green Blink 100Mbps Activity
- Amber ON 10Mbps Link
- Amber Blink 10Mbps Activity

**Right LED**

- Green ON Full Duplex
- OFF Half Duplex

The Ethernet port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.

***Table 3-6 PremierWave XN LEDs and Descriptions***

| LED | Description |
|---|---|
| **Power** | ◆ GREEN - displays a solid light when power is properly supplied.<br>◆ OFF - no power supplied. |
| **WLAN** | ◆ AMBER - flashes when the RX/TX packets are detected on the WLAN interface.<br>◆ OFF - indicates WLAN interface is inactive or disabled. |
| **Serial 1** | ◆ GREEN - flashes when Serial port 2 is transmitting data.<br>◆ AMBER - flashes when Serial port 2 is receiving data.<br>◆ OFF - when no data is being transmitted or received through Serial port 2. |
| **Serial 2** | ◆ GREEN - flashes when Serial port 2 is transmitting data.<br>◆ AMBER - flashes when Serial port 2 is receiving data.<br>◆ OFF - when no data is being transmitted or received through Serial port 2. |

| LED (continued) | Description |
|---|---|
| **USB 1** | ◆ GREEN - displays a solid light when a USB device is connected to USB 1 Host port and is functioning properly.<br>◆ OFF- when no USB device is connected to USB 1 Host port. |
| **USB 2** | ◆ GREEN - displays a solid light when a USB device is connected to USB 2 Host port and is functioning properly.<br>◆ OFF- when no USB device is connected to USB 2 Host port. |
| **Fault/Diagnostic** | See *Table 3-10* for diagnostic indications. |
| **Signal Strength LEDs** | Indicates WLAN signal strength when connection is established. During WPS negotiation and connection establishment, it reports status of WPS transaction.<br>◆ When indicating the WLAN signal strength, see *Table 3-7* for signal strength information for connections in 5 GHz band or *Table 3-8* for signal strength information for connections in 2.4 GHz band.<br>◆ For WPS status indications, see *Table 3-9*. |

***Table 3-7 WLAN Signal Strength Indicator at 5 GHz***

| Signal Strength | Color & Number of LED Signal Bars |
|---|---|
| Greater than or equal to -60 dBm | 5 Green |
| Greater than or equal to -62 dBm and less than -60 dBm | 4 Green |
| Greater than or equal to -65 dBm and less than -62 dBm | 3 Green |
| Greater than or equal to -68 dBm and less than -65 dBm | 2 Amber |
| Greater than or equal to -70 dBm and less than -68 dBm | 1 Amber |
| Less than -70 dBm | All Off |

***Table 3-8 WLAN Signal Strength Indicator at 2.4 GHz***

| Signal Strength | Color & Number of LED Signal Bars |
|---|---|
| Greater than or equal to -60 dBm | 5 Green |
| Greater than or equal to -67 dBm and less than -60 dBm | 4 Green |
| Greater than or equal to -73 dBm and less than -67 dBm | 3 Green |
| Greater than or equal to -98 dBm and less than -73 dBm | 2 Amber |
| Greater than or equal to -110 dBm and less than -98 dBm | 1 Amber |
| Less than -110 dBm | All Off |

***Table 3-9 WPS Status Indicator***

When the signal strength indicator is used to indicate the WPS status, only one amber LED will be used.

| WPS Status | Blink Pattern |
|---|---|
| WPS is enabled and on | Short, continuous |
| WPS has a profile error | Long, long, long, short, short, 2 seconds off, continuous |
| WPS has a timeout error | Long, long, long, short, short, short, short, 2 seconds off, continuous |

***Table 3-10 Diagnostic LED Indications***

| Fault Conditions | Blink Pattern |
|---|---|
| No Ethernet link when eth0 is enabled | Long, long, short, short, 2 seconds off, continuous |
| No WLAN link (no BSSID detected) when wlan0 is enabled | Long, long, long, short, short, 2 seconds off, continuous |
| No IP obtained from WLAN when wlan0 is enabled and the bridge mode is disabled. | Long, long, long, short, short, short, 2 seconds off, continuous |
| Over temperature or when the internal temperature reaches 85°F. | Long, short, short, short, 2 seconds off, continuous |
| Loss of power or when both the terminal and barrel power input is below 9 volts. | Long, short, short, 2 seconds off, continuous |

***Notes:***

- *For Table 3-10 above, a "long" blink is 0.7 seconds of light followed by 0.3 seconds of no light. A "short" blink is a light that is on for only 0.2 seconds and followed by 0.2 seconds of no light.*
- *The diagnostic blink patterns reflect the highest priority fault condition. Also, the Diagnostic LED will give an initial, identifying blink pattern to indicate the type of diagnostic information it will display. All power and other non-network related diagnostic patterns begin with one long blink. All wired LAN related diagnostics patterns begin with two long blinks. All WLAN related diagnostics patterns begin with three long blinks.*

### *Reset Button*

You can reset the PremierWave XN to factory defaults, including clearing the network settings. The IP address, gateway, and netmask are set to 00s. To reset the unit to factory defaults, perform the following steps.

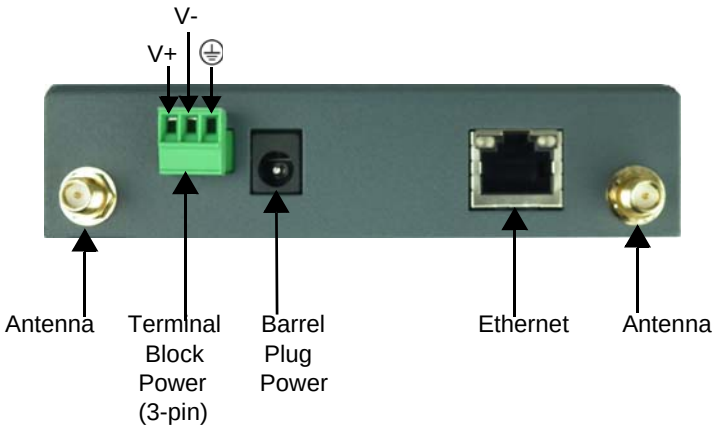
1. Place the end of a paper clip or similar object into the reset opening (see *Figure 3-11*) and press and hold down micro switch during a power cycle for a minimum of 10-15 seconds.
2. Remove the paper clip to release the button. The unit will continue the boot process restoring it back to the original factory default settings.

- 

## Back Panel

On the PremierWave XN is a Power 1 Plug, 3-Pin Terminal Connector for Backup Power, and RJ-45 Ethernet port as shown in *Figure 3-11*.

**Figure 3-11 PremierWave XN Bottom/Back Panel View**




## Wi-Fi Protected Setup (WPS)

Using WPS, you have the option of connecting to PremierWave devices with a router or access point in a single operation instead of manually creating a profile with a network name (SSID), setting up wireless security parameters and updating the choice list.

**Figure 3-12 PremierWave XN WPS Button**


## To Start WPS

### *Using the Device*

1. Place the end of a paper clip or similar object into the WPS opening (see *Figure 3-12*) and press and hold down for a minimum of 5 seconds.
2. Remove the paper clip to release the button. The unit will start Wi-Fi Protected Setup.

#### *Using the CLI*

- To enter the command level: `enable -> config -> if 2 -> link`

### To Cancel WPS

#### *Using the CLI*

- To enter the command level: `enable -> config -> if 2 -> link`

### To Show WPS Status

#### *Using the CLI*

- To enter the command level: `enable -> config -> if 2 -> link`

## Installing the PremierWave XN

Be sure to place or mount the device securely on a flat horizontal or vertical surface. The device comes with mounting brackets for mounting the device vertically, for example on a wall. If using AC power, avoid outlets controlled by a wall switch.

**Observe the following guidelines when connecting the** serial **devices:**

- The PremierWave XN serial ports support RS-232/422/485.
- The null modem cable is the best cable to connect the serial device to another DTE device. The straight-though (modem) cable is the best cable to connect the serial port to a DCE device.
- Connect your RJ-45 Ethernet cable to the RJ-45 port of the unit.
- The device supports a power range of 9 to 30 VDC. You can power up the device with barrel-power connector and/or the 3 pin terminal connector for backup power supply.

***Note:*** *As soon as you plug the device into power, the device powers up automatically, the self-test begins, and LEDs would indicate the device's status*

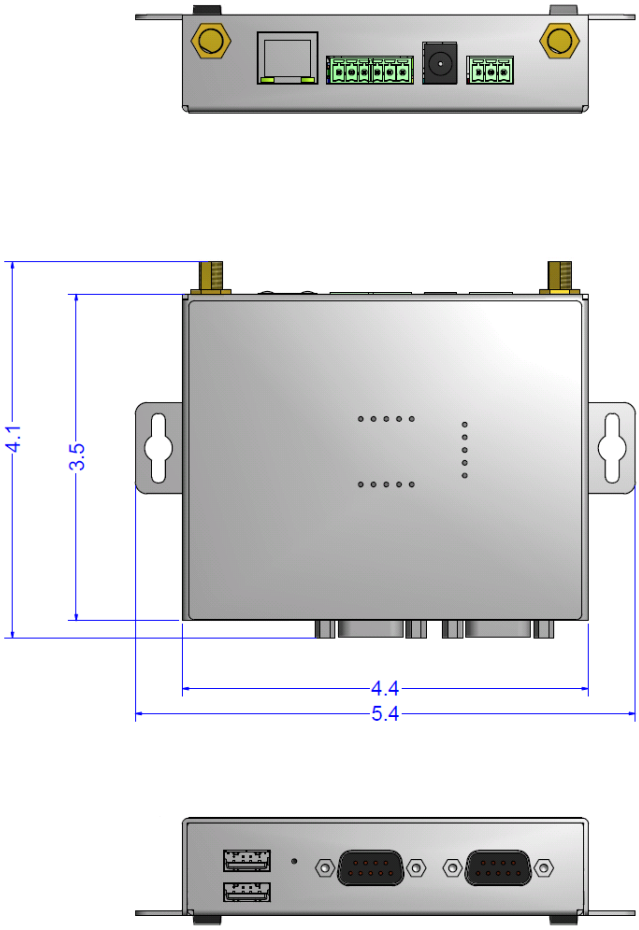
**Perform the following steps to install your device:**

1. Connect devices to the serial ports.
2. Connect a RJ-45 Ethernet cable between the unit and your Ethernet network.
3. Connect the Antennas to the SMA connector on the side. Do note that the safe distance due to RF exposure from antenna is 23cm.

***Note:*** *Antennas must be installed prior to powering on the unit. Do not remove or connect the antennas while the unit power is on.*

4. Plug the PremierWave XN into the power outlet by using the included power supply.

**Figure 3-13 PremierWave XN Dimensions in Millimeters (mm)**



# 4: Using DeviceInstaller

This chapter covers the steps for locating a PremierWave XN unit and viewing its properties and device details. DeviceInstaller is a free utility program provided by Lantronix that discovers, configures, upgrades and manages Lantronix Device Servers.

***Notes:***

- *For instructions on using DeviceInstaller to configure the IP address and related settings or for more advanced features, see the DeviceInstaller Online Help.*
- *Auto IP generates a random IP address in the range of 169.254.0.1 to 169.254.255.254, with a netmask of 255.255.0.0, if no BOOTP or DHCP server is found. These addresses are not routable.*

## Accessing PremierWave XN Using DeviceInstaller

***Note:*** *Make note of the MAC address. It is needed to locate the PremierWave XN using DeviceInstaller.*

To use the DeviceInstaller utility, first install the latest version from the downloads page on the Lantronix web site www.lantronix.com/downloads.

1. Run the executable to start the installation process and respond to the installation wizard prompts. (If prompted to select an installation type, select **Typical**.)
2. Click **Start -> All Programs -> Lantronix -> DeviceInstaller -> DeviceInstaller**.
3. When DeviceInstaller starts, it will perform a network device search. To perform another search, click **Search**.
4. Expand the PremierWave XN folder by clicking the + symbol next to the folder icon. The list of available Lantronix PremierWave XN devices appears.
5. Select the PremierWave XN unit by expanding its entry and clicking on its IP address to view its configuration.
6. On the right page, click the **Device Details** tab. The current PremierWave XN configuration appears. This is only a subset of the full configuration; the full configuration may be accessed via Web Manager, CLI or XML.

## Device Detail Summary

***Note:*** *The settings are Display Only in this table unless otherwise noted*

| Current Settings | Description |
|---|---|
| **Name** | Name identifying the PremierWave. |
| **DHCP Device Name** | The name associated with the PremierWave's current IP address, if the IP address was obtained dynamically. |

| Current Settings *(continued)* | Description |
|---|---|
| **Group** | Configurable field. Enter a group to categorize the PremierWave. Double-click the field, type in the value, and press Enter to complete. This group name is local to this PC and is not visible on other PCs or laptops using DeviceInstaller. |
| **Comments** | Configurable field. Enter comments for the PremierWave. Double-click the field, type in the value, and press Enter to complete. This description or comment is local to this PC and is not visible on other PCs or laptops using DeviceInstaller. |
| **Device Family** | Shows the PremierWave device family type as “PremierWave”. |
| **Type** | Shows the device type as “PremierWave”. |
| **ID** | Shows the PremierWave ID embedded within the unit. |
| **Hardware Address** | Shows the PremierWave hardware (MAC) address. |
| **Firmware Version** | Shows the firmware currently installed on the PremierWave. |
| **Extended Firmware Version** | Provides additional information on the firmware version. |
| **Online Status** | Shows the PremierWave status as Online, Offline, Unreachable (the PremierWave is on a different subnet), or Busy (the PremierWave is currently performing a task). |
| **IP Address** | Shows the PremierWave current IP address. To change the IP address, click the Assign IP button on the DeviceInstaller menu bar. |
| **IP Address was Obtained** | Appears “Dynamically” if the PremierWave automatically received an IP address (e.g., from DHCP). Appears “Statically” if the IP address was configured manually.<br>If the IP address was assigned dynamically, the following fields appear:<br>◆ **Obtain via DHCP** with values of True or False.<br>◆ **Obtain via BOOTP** with values of True or False. |
| **Subnet Mask** | Shows the subnet mask specifying the network segment on which the PremierWave resides. |
| **Gateway** | Shows the IP address of the router of this network.<br>There is no default. |
| **Number of Ports** | Shows the number of serial ports on this PremierWave. |
| **Supports Configurable Pins** | Shows False, indicating configurable pins are not available on the PremierWave XN. |
| **Supports Email Triggers** | Shows True, indicating email triggers are available on the PremierWave. |
| **Telnet Supported** | Indicates whether Telnet is enabled on this PremierWave. |
| **Telnet Port** | Shows the PremierWave port for Telnet sessions. |
| **Web Enabled** | Indicates whether Web Manager access is enabled on this PremierWave. |
| **Web Port** | Shows the PremierWave port for Web Manager configuration (if Web Enabled field is True). |
| **Firmware Upgradable** | Shows True, indicating the PremierWave firmware is upgradable as newer versions become available. |

# 5: Configuration Using Web Manager

This chapter describes how to configure PremierWave XN using Web Manager, the Lantronix browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and is retained without power. All changes take effect immediately, unless otherwise noted. It contains the following sections:



## Accessing Web Manager

***Note:*** *You can also access the Web Manager by selecting the Web Configuration tab on the DeviceInstaller window.*

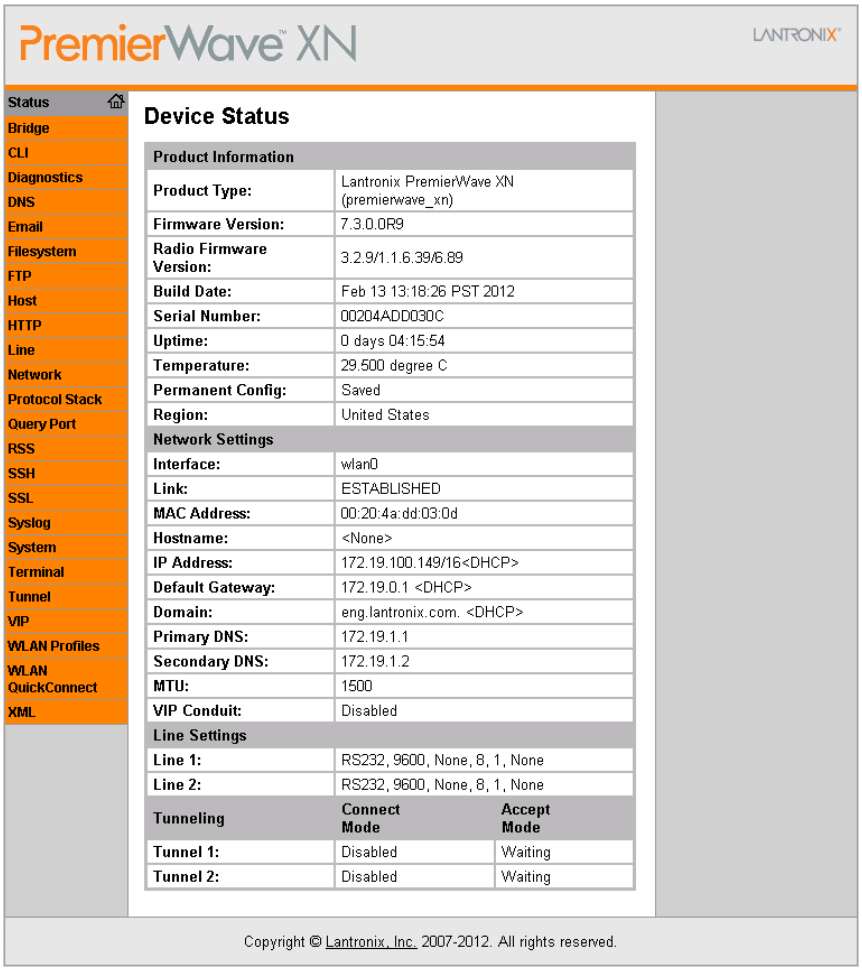
**To access Web Manager, perform the following steps:**

1. Open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Suite, Mozilla Firefox, Safari, Chrome or Opera.
2. Enter the IP address or hostname of the PremierWave XN in the address bar. The IP address may have been assigned manually using DeviceInstaller (see the *PremierWave XN Quick Start Guide*) or automatically by DHCP.
3. Enter your username and password.The factory-default username is "admin" and the password is "PASS". The Device Status web page displays configuration, network settings, line settings, tunneling settings, and product information.

***Note:*** *The Logout button is available on any web page. Logging out of the web page would force re-authentication to take place the next time the web page is accessed.*

## Device Status Page

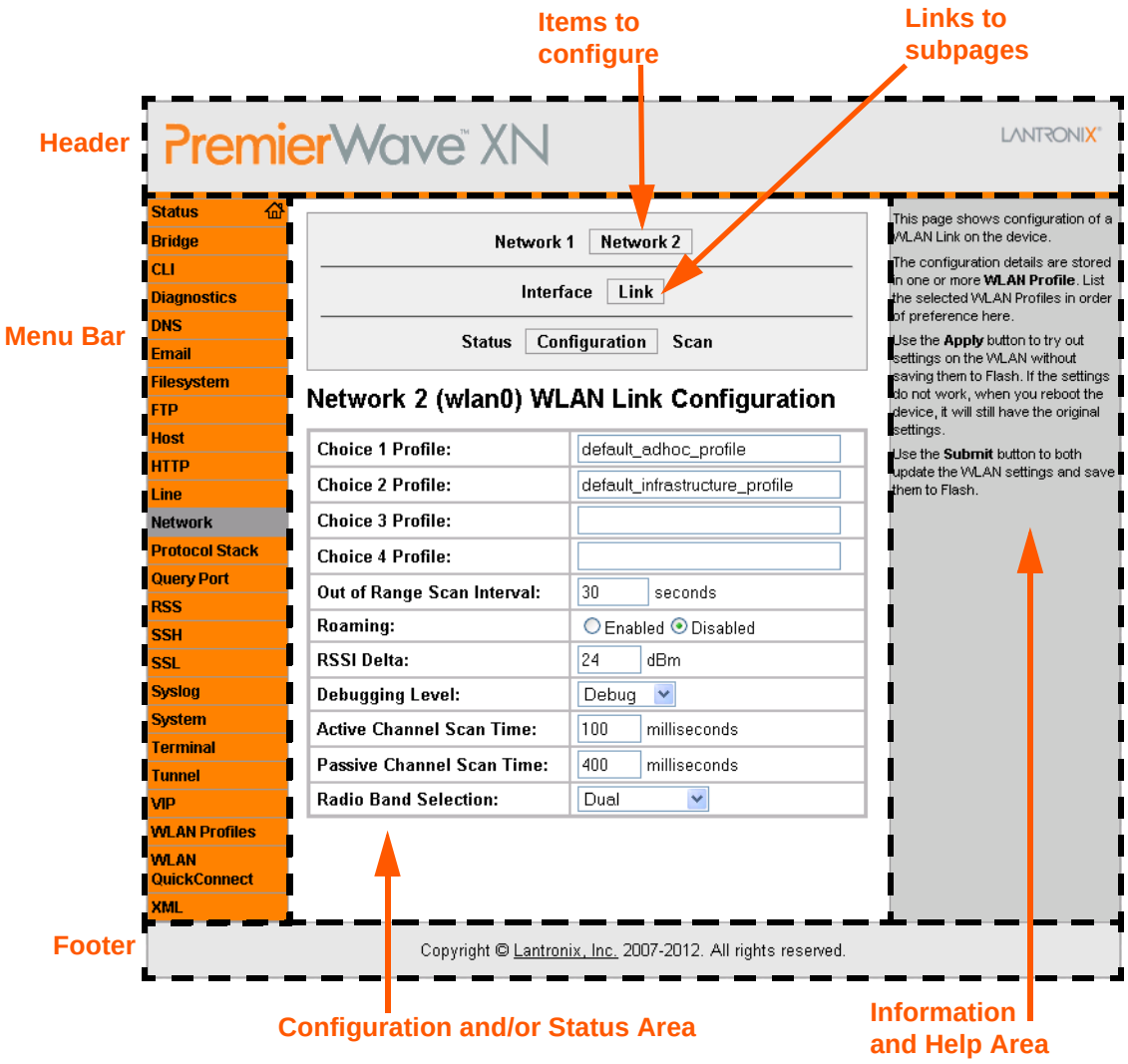
The page is the first page that appears after you log into Web Manager. The Device Status page appears when you click **Status** in the Main Menu in Web Manager.



## Web Manager Components

The layout of a typical Web Manager page is below.

**Figure 5-1 Components of the Web Manager Page**




### *Web Manager pages have these sections:*

The menu bar always appears at the left side of the page, regardless of the page shown. The menu bar lists the names of the pages available in the Web Manager. To bring up a page, click it in the menu bar.

The main area of the page has these additional sections:

- Links near the top of many pages, such as the one in the example above, enable you to link to additional subpages. On some pages, you must also select the item you are configuring, such as a line or a tunnel.

- In the middle of many pages, you can select or enter new configuration settings. Some pages show status or statistics in this area rather than allow you to enter settings.
- At the bottom of most pages, the current configuration is displayed. In some cases, you can reset or clear a setting.
- The information or help area shows information or instructions associated with the page.
- A **Logout** link is available at the upper right corner of every page. In Chrome or Safari, it is necessary to close out of the browser to completely logout. If necessary, reopen the browser to log back in.
- The footer appears at the very bottom of the page. It contains copyright information and a link to the Lantronix home page.

## Navigating Web Manager

The Web Manager provides an intuitive point-and-click interface. A menu bar on the left side of each page provides links you can click to navigate from one page to another. Some pages are read-only, while others let you change configuration settings.

***Note:*** *There may be times when you must reboot the PremierWave XN for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot. Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

| Web Manager Page | Description | See Page |
|---|---|---|
| **Status** | Shows product information and network, line, and tunneling settings. | *28* |
| **Bridge** | Allows you to configure a bridge and shows the current operational state of the bridge. | *89* |
| **CLI** | Shows Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings. | *84* |
| **Diagnostics** | Lets you perform various diagnostic procedures. | *78* |
| **DNS** | Shows the current configuration of the DNS subsystem and the DNS cache. | *60* |
| **Email** | Shows email statistics and lets you clear the email log, configure email settings, and send an email. | *83* |
| **Filesystem** | Shows file system statistics and lets you browse the file system to view a file, create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions. | *73* |
| **FTP** | Shows statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server. | *61* |
| **Host** | Lets you view and change settings for a host on the network. | *58* |
| **HTTP** | Shows HyperText Transfer Protocol (HTTP) statistics and lets you change the current configuration and authentication settings. | *62* |
| **Line** | Shows statistics and lets you change the current configuration and Command mode settings of a serial line. | *46* |
| **Network** | Shows status and lets you configure the network interface. | *32* |

| Web Manager Page (continued) | Description | See Page |
|---|---|---|
| **Protocol Stack** | Lets you perform lower level network stack-specific activities. | *75* |
| **Query Port** | Lets you change configuration settings for the query port. | *77* |
| **RSS** | Lets you change current Really Simple Syndication (RSS) settings. | *64* |
| **SmartRoam** | Lets you configure SmartRoam options through Network Link Settings. | *34* |
| **SSH** | Lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users. | *66* |
| **SSL** | Lets you upload an existing certificate or create a new self-signed certificate. | *69* |
| **Syslog** | Lets you specify the severity of events to log and the server and ports to which the syslog should be sent. | *61* |
| **System** | Lets you reboot device, restore factory defaults, upload new firmware, and change the device long and short names. | *82* |
| **Terminal** | Lets you change current settings for a terminal. | *57* |
| **Tunnel** | Lets you change the current configuration settings for a tunnel. | *48* |
| **VIP** | Lets you configure Virtual IP addresses to be used in Tunnel Accept Mode and Tunnel Connect Mode. | *96* |
| **WLAN Profiles** | Lets you view, edit, delete and create a WLAN profile on a device. | *38* |
| **XML** | Lets you export XML configuration and status records, and import XML configuration records. | *86* |

# 6: Network Settings

The Network Settings show the status of the Ethernet or WLAN interface/link and let you configure the settings on the device. Interface settings are related to the configuration of the IP and related protocols. Link settings are related to the physical link connection, which carries the IP traffic.

The PremierWave XN contains two network interfaces. Only one interface may be active at a time; however, if bridging is enabled, both interfaces will be activated and controlled by the bridging subsystem.The Ethernet interface is also called interface 1 or eth0, and the WLAN interface is called interface 2 or wlan0.

***Notes:***

- *Some settings require a reboot to take effect. These settings are noted below.*
- *Wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*
- *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

## Network Interface Settings

*Table 6-1* shows the network interface settings that can be configured.

These settings apply to both the Ethernet (eth0) and WLAN (wlan0) interfaces, but are configured independently for each interface.

***Table 6-1 Network Interface Settings***

| Network Interface Settings | Description |
|---|---|
| **State** | Enables or disables the interface. |
| **BOOTP Client** | Select to turn **On** or **Off**. At boot up, after the physical link is up, the PremierWave will attempt to obtain IP settings from a BOOTP server.<br>***Note:*** *Overrides the configured IP address/mask, gateway, hostname, and domain. When DHCP is **Enabled**, the system automatically uses DHCP, regardless of whether BOOTP is **Enabled**. Changing this value requires you to reboot the device.* |
| **DHCP Client** | Select to turn **On** or **Off**. At boot up, after the physical link is up, the PremierWave will attempt to obtain IP settings from a DHCP server and will periodically renew these settings with the server.<br>***Note:*** *Overrides BOOTP, the configured IP address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device.*<br>***Note:*** *Within WebManager, click **Renew** to renew the DHCP lease.* |

| Network Interface Settings (continued) | Description |
|---|---|
| **IP Address** | Enter the static IP address to use for the interface. You may enter it alone or in CIDR format.<br>***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disabled**). Changing this value requires you to reboot the device. When DHCP or BOOTP is enabled, the PremierWave XN tries to obtain an IP address from a DHCP or BOOTP server. If it cannot, the PremierWave XN generates and uses an Auto IP address in the range of 169.254.xxx.xxx, with a network mask of 255.255.0.0.* |
| **Default Gateway** | Enter the IP address of the router for this network.<br>***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disabled**).* |
| **Hostname** | Enter the hostname for the interface. It must begin with a letter or number, continue with a sequence of letters, numbers, or hyphens, and end with a letter or number.<br>***Note:*** *This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.* |
| **Domain** | Enter the domain name suffix for the interface.<br>***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no Domain Suffix was acquired from the server.* |
| **DHCP Client ID** | Enter the ID if the DHCP server requires a DHCP Client ID option. The DHCP server's lease table shows IP addresses and MAC addresses for devices. The lease table shows the Client ID, in hexadecimal notation, instead of the PremierWave XN MAC address. |
| **Primary DNS** | Enter the IP address of the primary Domain Name Server.<br>***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.* |
| **Secondary DNS** | Enter the IP address of the secondary Domain Name Server.<br>***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.* |
| **MTU** | When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes, the default being 1500 bytes. |

## To Configure Network Interface Settings

### *Using Web Manager*

- To modify Ethernet (eth0) settings, click **Network** on the menu and select **Network 1 -> Interface -> Configuration**.
- To modify Wireless (wlan0) settings, click **Network** on the menu and select **Network 2 -> Interface -> Configuration**.

### *Using the CLI*

- To enter the eth0 command level: `enable -> config -> if 1`
- To enter the wlan0 command level: `enable -> config -> if 2`

#### *Using XML*

- Include in your file: `<configgroup name="interface" instance="eth0">`
- Include in your file: `<configgroup name="interface" instance="wlan0">`

### To View Network Interface Status

#### *Using Web Manager*

In Network Interface Status, you can view both the current operational settings as well as the settings that would take affect upon a device reboot.

- To view Ethernet (eth0) Status, click **Network** on the menu and select **Network 1 -> Interface -> Status**.
- To view Wireless (wlan0) Status, click **Network** on the menu and select **Network 2 -> Interface -> Status**.

## Network Link Settings

Physical link parameters can be configured for an Ethernet (eth0) Network Interface (see *Table 6-2*) and a WLAN (wlan0) Network Interface (see *Table 6-3*).

***Table 6-2 Network 1 (eth0) Link Settings***

| Network 1 Ethernet (eth0) Link Settings | Description |
|---|---|
| **Speed** | Select the Ethernet link speed. (Default is Auto)<br>◆ **Auto** = Auto-negotiation of Link Speed<br>◆ **10 Mbps** = Force 10 Mbps<br>◆ **100 Mbps** = Force 100 Mbps |
| **Duplex** | Select the Ethernet link duplex mode. (Default is Auto)<br>◆ **Auto** = Auto-negotiation of Link Duplex<br>◆ **Half** = Force Half Duplex<br>◆ **Full** = Force Full Duplex |

***Notes:***

- *When speed is **Auto**, duplex must be **Auto** or **Half**.*
- *When speed is not **Auto**, duplex must be **Half** or **Full**.*
- *Fixed speed Full duplex will produce errors connected to Auto, due to duplex mismatch.*

### SmartRoam

SmartRoam monitors the signal strengths of all in-range access points belonging to the Extended Service Set (ESS) to which the PremierWave is currently connected. When an AP is found with a signal strength which is significantly greater than that of the currently associated AP, SmartRoam automatically switches to the new AP. This reduces interruptions in wireless connectivity and ensures optimal signal strength. Roaming happens automatically and is completely transparent to the user; no loss of network connectivity should occur.

SmartRoam periodically scans for access points which belong to the current ESS (having the same SSID and security settings at the currently associated AP.) The results are then searched for an AP with a 'stronger' signal (higher RSSI) than the current AP. If the search is successful, SmartRoam triggers a disconnection from the current AP and a connection to the one selected from the scan results.

Since moving between access points are a time-consuming process which can negatively impact throughput, SmartRoam employs a delta value to ensure that the move only occurs if there would be a significant gain in signal strength. When searching the results of a scan, SmartRoam only considers those APs whose RSSI exceeds that of the currently associated AP by at least the delta value.

***Note:*** *RSSI is reported in two different ways: when accessed through WebManager, you will be given the value of a single, instantaneous sample versus when you access the RSSI roaming state through the CLI, where the RSSI value given is averaged over time.*

***Table 6-3 Network 2 (wlan0) Link Settings***

| Network 2 WLAN (wlan0) Link Settings | Description |
|---|---|
| **Choice 1 Profile**<br>**Choice 2 Profile**<br>**Choice 3 Profile**<br>**Choice 4 Profile** | ◆ Select up to four (4) WLAN Profiles for automatic connection to wireless networks. More information on wireless settings is available in the section, *To Configure Network Link Settings on page 36*.<br>◆ Enter the name of the WLAN Profile desired for each choice. |
| **Out of Range Scan Interval** | Set the amount of time in seconds, between SmartRoaming scans. |
| **Roaming** | Click to Enable or Disable SmartRoaming. |
| **RSSI Delta** | The minimum difference (in dBm) between the current RSSI and the RSSI of any access point in the scan results before it will be considered as a roaming candidate. The configured value will actually be used for the high-power delta. The roaming delta is cut in half for RSSI below -50dBm. The value for the low-power delta will be derived from the configured one by dividing it by two. Default value: 24dBm, range: 14 - 24dBm. When searching the results of a scan, SmartRoam only considers those APs whose RSSI exceeds that of the currently associated AP by at least the delta value. Since moving between access point is a time-consuming process which can negatively impact throughput, SmartRoam employs a delta value to ensure that the move only occurs if there would be a significant gain in signal strength. |
| **Debugging Level** | Set the verbosity level for printing WLAN Link messages to the TLOG (Default is Info). |
| **Active Channel Scan Time** | Set the amount of time, in milliseconds, the radio will dwell on each individual channel when performing an active scan. During active scanning, the radio transmits probe requests and gathers probe responses from other devices. The range of values is 50 to 150 msec. |
| **Passive Channel Scan Time** | Set the amount of time, in milliseconds, the radio will dwell on each individual channel when performing a passive scan. During passive scanning the radio does not transmit probe requests, instead relying on beacons sent by other devices. The range of values is 100 to 400 msec. |
| **Radio Band Selection** | Select the band(s) on which the radio will operate. Options are 2.4 GHz only, 5 GHz only or Dual band. |

## To Configure Network Link Settings

### *Using Web Manager*

- To modify Ethernet (eth0) Link information, click **Network** on the menu and select **Network 1 -> Link**.
- To modify Wireless (wlan0) Link information, click **Network** on the menu and select **Network 2 -> Link -> Configuration.**

### *Using the CLI*

- To enter the eth0 Link command level: `enable -> config -> if 1 -> link`
- To enter the wlan0 Link command level: `enable -> config -> if 2 -> link` or `enable -> config -> if 2 -> link -> choice 1|2|3|4`

### *Using XML*

- Include in your file: `<configgroup name="ethernet" instance="eth0">`
- Include in your file: `<configgroup name="wlan" instance="wlan0">`

## WLAN Link Status and Scan Commands

These commands display information about the current state of the wireless network.

***Table 6-4 Network 2 Link Scan***

| WLAN Link Information Commands | Description |
|---|---|
| **Scan "<network SSID>"** | Perform a scan for devices within range of the PremierWave XN. Including the optional network SSID limits the scan to devices configured with the specified network SSID. Omitting the network SSID performs a scan for all devices in range.<br>***Note:*** *When omitting the network SSID it is still necessary to include the opening and closing quotation marks (scan "").  When the PremierWave is associated with an access point, scanning is only preformed on the band on which the unit is connected.* |
| **Refresh scan results every 15 seconds** (checkbox) | ◆ Check this to auto update the list of networks every 15 seconds.<br>◆ Uncheck this to stop auto update. |

The results of the ***scan*** command are presented in the following format in the table below:

***Table 6-5 Network 2 Link Scan Results on WebManager***

| WLAN Link Scan Results Field | Description |
|---|---|
| **Network Name** | The Service Set Identifier (network name) of the device. |
| **BSSID** | Basic Service Set Identifier. |
| **Ch/Channel** | The channel on which the device is operating. |

| WLAN Link Scan Results Field | Description |
|---|---|
| **RSSI** | The instantaneous Received Signal Strength Indicator (RSSI) of the device measured in dBm.<br>***Note:*** *RSSI reported in scan results is a single sampling, while the RSSI reported in the 'status' command (showing the signal strength of the currently connected AP) is averaged over time.* |
| **Security Suite** | Indicates the security suite in use by the device as well as whether it is operating in Adhoc (IBSS) mode. |

The results of the ***status*** command are presented in the following format:

***Table 6-6 Network 2 Link Status***

| WLAN Link Status | Description |
|---|---|
| **Connection State** | Indicates the connection state. |
| **BSSID** | A unique identifier for the Basic Service Set corresponding to the MAC address of the Access Point in infrastructure mode, or a generated value in Adhoc mode. |
| **SSID** | The Service Set Identifier of the connected network. |
| **Topology** | The type of wireless network in use for the current association (Adhoc or Infrastructure). |
| **Active WLAN Profile** | Indicates which WLAN profile created the current connection to the wireless network. |
| **Pairwise Cipher** | The standard used to encrypt a particular type of data in the current wireless association. |
| **Group Cipher** | The standard used to encrypt a particular type of data in the current wireless association. |
| **Authentication** | Indicates the method of distributing encryption key material. |
| **Security Suite** | Indicates the security suite used for the current association. |
| **Channel** | The channel used for the current association. |
| **IP Address** | The IP address assigned to the PremierWave. |
| **RSSI** | A measure of the power level of the received radio signal in dBm, specifically the RSSI of the currently associated AP averaged over time.<br>***Note:*** *RSSI reported in scan results is a single sampling, while the RSSI reported in the 'status' command (showing the signal strength of the currently connected AP) is averaged over time.* |
| **WPS Mode** | Indicates whether WPS is activated. |

## To View WLAN Link Scan and Status Information

### *Using Web Manager*

- To scan the Wireless (wlan0) Link, click **Network** in the menu and select **Network 2 -> Link -> Scan**.
- To view the Wireless (wlan0) Link status information, click **Network** in the menu and select **Network 2 -> Link -> Status**.

### Using the CLI

- To enter the wlan0 Link command level: `enable -> config -> if 2 -> link`

### Using XML

- Include in your file:

```
<statusgroup name="wlan status">
```

and

```
<statusgroup name="wlan scan">
```

## WLAN Profiles

A WLAN profile defines all of the settings necessary to establish a wireless connection with either an access point (in infrastructure mode) or another wireless client (in Adhoc mode.) A maximum of eight profiles can exist on the PremierWave XN at a time. In PremierWave XN, all enabled profiles are active.

PremierWave now supports dynamic profiles and prioritization of the profiles. Dynamic Profiles are the ones created via WPS or QuickConnect. Profiles are numbered based on priority. Dynamic profiles (in reversed order of creation), choice list profiles (Choice1, Choice2, Choice3, and Choice4), and then the remaining profiles. Use the number from output of 'show' command.

### To Configure WLAN Profiles

You can view, edit, create or delete a WLAN profile.

### Using WebManager

- Click **WLAN Profiles** on the menu.

### Using the CLI

- To enter the wlan0 Profile command level: `enable -> config -> wlan profiles`

### Using XML

- Include in your file: `<configgroup name="wlan profile" instance="profile_name">`

***Table 6-7 Creating, Deleting or Enabling WLAN Profiles***

| WLAN Profile Basic Settings | Description |
|---|---|
| **Create new profile** | Type in the name of the new profile to be created into the **Create new profile** field. Then, click the **Submit** button which appears to create the profile. Once created, the profile name may be clicked so you may edit profile settings (see *Table 6-8*). |

| WLAN Profile Basic Settings | Description |
|---|---|
| **Delete** (checkbox) | Click the **Delete** checkbox beside the profile(s) to be deleted. Three buttons will appear:<br>◆ Click the **Submit** button to permanently delete profile(s).<br>◆ Click the **Apply** button to delete the profile for testing purposes. If the device reboots, this change will not be applied.<br>◆ Click the **Cancel** button to cancel this action, as desired. |
| **Enabled** (checkbox) | Click the **Enabled** checkbox beside the profile(s) to be enabled. Three buttons will appear:<br>◆ Click the **Submit** button to permanently enable profile(s).<br>◆ Click the **Apply** button to enable the profile for testing purposes. If the device reboots, this change will not be applied.<br>◆ Click the **Cancel** button to cancel this action, as desired. |
| **WLAN Profile**<br>(link to specific profile) | Click on a specific WLAN Profile name to edit the WLAN profile basic settings (see *Table 6-8*). |

***Table 6-8 WLAN Profile Basic Settings***

| WLAN Profile Basic Settings | Description |
|---|---|
| **Network Name (SSID)** | Specify the name of the wireless network (SSID.)<br>***Warning:*** ***Creating a new profile with a pre-existing network name will cause the original network name and associated profile to be overwritten.*** |
| **State** | Select to **Enable** or **Disable**. |
| **Topology** | Specify Infrastructure (ESS) or Adhoc (IBSS) mode.<br>◆ **Infrastructure**: mode that communicates with access points.<br>◆ **Adhoc**: mode that communicates with other clients. |
| **Channel** | Specify the channel for an Adhoc network.<br>***Note:*** *This setting only applies to the creation of an Adhoc network.* |
| **Scan 2.4 GHz Band** | Select to **Enable** or **Disable** scanning for a WLAN profile on the 2.4 GHz band.<br>***Note:*** *Setting this value to "Disabled" prevents this profile from connecting to any device operating in the 2.4 GHz band.* |
| **Scan 5 GHz Band** | Select to **Enable** or **Disable** scanning for a WLAN profile on the 5 GHz band.<br>***Note:*** *Setting this value to "Disabled" prevents this profile from connecting to any device operating in the 5 GHz band.* |
| **Scan DFS Channels** | Select to **Enable** or **Disable** scanning on the DFS (Dynamic Frequency Selection) channels in the 5 GHz band.<br>***Note:*** *This setting only applies if scanning in the 5 GHz band is enabled.* |

## To Configure WLAN Profile Basic Settings

### *Using Web Manager*

◆ To view or edit an existing WLAN profile or to create a new profile, click **WLAN Profiles** on the menu and select an existing profile.

### Using the CLI

- To enter the wlan0 Profile command level: `enable -> config -> wlan profiles -> edit` <profile number> or `enable -> config -> wlan profiles -> edit` <profile name>

### Using XML

- Include in your file:

  `<configgroup name="wlan profile" instance="`profile name`">`

  and

  `<configitem name="basic">`

*Table 6-9 WLAN Profile Advanced Settings*

| WLAN Profile Advanced Settings | Description |
|---|---|
| **TX Data Rate Maximum** | Specify the rate for data transmission.<br>***Note:*** *This setting only applies if '**TX Data Rate**' is set to '**Fixed**'.* |
| **TX Data Rate** | Specify the type of transmission data rate:<br>◆ **Fixed** = keeps the transmission rate at the configured value.<br>◆ **Auto-reduction** = allows the PremierWave to reduce the data rate automatically, depending on link quality. |
| **TX Power Maximum** | Specify the maximum transmission output power in dBm. |
| **Antenna Diversity** | Select the antenna the radio will use or allow PremierWave XN to automatically make the selection.<br>◆ **Enabled** = allow the PremierWave to select the antenna.<br>◆ **Antenna 1** = use the internal antenna.<br>◆ **Antenna 2** = use the external antenna. |
| **Power Management** | Select to **Enable** or **Disable** power management, which reduces the overall power consumption of the PremierWave unit, but can increase latency.<br>◆ **Enabled** = allows the PremierWave to turn off the receiver when it is idling.<br>◆ **Disabled** = keeps the receiver on at all times. |
| **Power Management Interval** | Select number of beacons (100 msec interval) between 1 and 10. The above-mentioned latency can be up to this number "X" 100 msec. |

## To Configure WLAN Profile Advanced Settings

### Using Web Manager

- To view or edit an existing WLAN Profile, click **WLAN Profiles** on the menu and select an existing profile.

### Using the CLI

- To enter the wlan0 Profile Advanced command level: `enable -> config -> wlan profiles -> edit` <profile name or number> `-> advanced`

### Using XML

- Include in your file:

  ```
  <configgroup name="wlan profile" instance="profile name">
  ```

  and

  ```
  <configitem name="security">
  ```

## WLAN Profile Security Settings

The PremierWave XN supports WEP, WPA, and WPA2/IEEE 802.11i to secure all wireless communication. WPA and WPA2/IEEE 802.11i are not available for Adhoc topology.

The WPA2/IEEE 802.11i mode is compliant with the Robust Secure Network specified in the IEEE standard 802.11i.

***Table 6-10 WLAN Profile Security Settings***

| WLAN Profile Security Settings | Description |
|---|---|
| **Suite** | Specify the security suite to be used for this profile.<br>◆ **None** = no authentication or encryption method will be used.<br>◆ **WEP** = Wired Equivalent Privacy<br>◆ **WPA** = WiFi Protected Access<br>◆ **WPA2** /IEEE 802.11i = Robust Secure Network. |
| **Key Type** | Select the format of the security key.<br>***Note:*** *This configuration option becomes available only when suites, WEP, WPA or WPA2/IEEE 802.11i are selected.* |
| **Passphrase** | Select the passphrase consists of up to 63 characters.<br>***Note:*** *This configuration option becomes available only when suites, WEP, WPA or WPA2/IEEE 802.11i are selected.*<br>***Note:*** *Lantronix recommends using a passphrase of 20 characters or more for maximum security. Spaces and punctuation characters are permitted.*<br>***Note:*** *The passphrase input is not the same as ASCII input (as used on some products.) ASCII is translated directly into hexadecimal bytes according to the ASCII table, while a possibly larger passphrase is hashed into a key and provides better security through a larger range of key values.* |

## To Configure WLAN Profile Security Settings

### Using Web Manager

- To view or edit an existing WLAN Profile, click **WLAN Profiles** on the menu and select an existing profile.

### Using the CLI

- To enter the wlan0 Profile Advanced Security Command level: `enable -> config -> wlan profiles -> edit 1 -> advanced -> security`

### *Using XML*

- Include in your file:

  `<configgroup name=:"wlan profile" instance="`profile name`">`

  and

  `<configitem name="security">>`

## WLAN Profile WEP Settings

WEP security is available in both **Infrastructure** and **AdHoc** modes. WEP is a simple and efficient security mode encrypting the data via the RC4 algorithm. However, WEP has become more vulnerable due to advances in hacking technology. State of the art equipment can find WEP keys in five minutes. For stronger security, please use WPA, or better, WPA2 with AES (CCMP).

***Table 6-11 Additional WEP Settings for WLAN Profile.***

| WLAN Profile WEP Settings | Description |
|---|---|
| **Authentication** | Select one of the following options:<br>◆ **Shared** = encryption keys of both parties are compared as a form of authentication. If mismatched, no connection is established.<br>◆ **Open** = a connection is established without first checking for matching encryption keys. However, mismatched keys will result in garbled data and thus a lack of connectivity on the IP level. |
| **Key Size** | Select the key size in bits. Select 40 for WEP40 and WEP64; select 104 for WEP104 and WEP128. |
| **TX Key Index** | Select one of four index listing keys for transmitting data. Reception is allowed with all four keys.<br>***Note:*** *For operability with some products that generate four identical keys from a passphrase, this index must be one.* |
| **Keys 1-4** | Enter one or more encryption keys in hexadecimal format. Enter 10 hexadecimal digits (0-9, a-f) for WEP40 and 26 for WEP104. The configured keys are not shown for security reasons. |

## To Configure WLAN Profile WEP Settings

### *Using Web Manager*

- To view or edit an existing WLAN Profile WEP setting, click **WLAN Profiles** on the menu, select an existing profile and select **WEP** for the suite.

### *Using the CLI*

- To enter the wlan0 Profile WEP command level: `enable -> config -> wlan profiles -> edit` <profile name or number> `-> advanced -> security -> wep`

### *Using XML*

- Include in your file:

```
<configgroup name="wlan profile" instance="profile name">
```

and

```
<configitem name="security">
```

## WLAN Profile WPA and WPA2/IEEE802.11i Settings

WPA and WPA2/IEEE802.11i security suites are available for **Infrastructure** mode only.

WPA is a security standard specified by the WiFi Alliance and is a close derivative of an early draft of the IEEE802.11i specification. WEP was becoming vulnerable and finalizing the IEEE802.11i standard was still far away. WPA2 is WiFi's subset of the broad IEEE802.11i standard to enforce better interoperability. The PremierWave XN is compliant with both WPA2 and IEEE802.11i.

***Table 6-12 WLAN Profile WPA and WPA2/IEEE802.11i Settings***

| WLAN Profile WPA & WPA2 Settings | Description |
|---|---|
| **Authentication** | Select the authentication method to be used.<br>◆ **PSK** = Pre-Shared Key. The same key needs to be configured on both sides of the connection. (On the PremierWave XN and on the Access Point.)<br>◆ **IEEE 802.1X** = This authentication method communicates with a RADIUS authentication server that is part of the network. The RADIUS server will match the credentials sent by the PremierWave XN with an internal database. |
| **Key** | 64 hexadecimal digits (32 bytes.) |
| **IEEE 802.1X** | Select the protocol to use to authenticate the WLAN client.<br>◆ **LEAP** = Lightweight Extensible Authentication Protocol. A derivative of the original **Cisco LEAP**, which was a predecessor of 802.1X. Real **Cisco LEAP** uses a special MAC layer authentication (called **Network EAP**) and cannot work with **WPA/WPA2**. The PremierWave XN uses a more generic version to be compatible with other major brand WiFi equipment. The authentication back end is the same.<br>◆ **EAP-TLS =** Extensible Authentication Protocol - Transport Layer Security. Uses the latest incarnation of the **Secure Sockets Layer (SSL)** standard and is the most secure because it requires authentication certificates on both the network side and the PremierWave XN side.<br>◆ **EAP-TTLS =** Extensible Authentication Protocol - Tunneled Transport Layer Security.<br>◆ **PEAP** = Protected Extensible Authentication Protocol.<br>◆ **EAP-TTLS** and **PEAP** have been developed to avoid the requirement of certificates on the client side (PremierWave XN), which makes deployment more cumbersome. Both make use of **EAP-TLS** to authenticate the server (network) side and establish an encrypted tunnel. This is called the outer-authentication. Then a conventional authentication method (**MD5**, **MSCHAP**, etc.) is used through the tunnel to authenticate the PremierWave XN. This is called inner authentication.<br>◆ **EAP-TTLS** and **PEAP** have been developed by different consortia and vary in details, of which the most visible is the supported list of inner authentications.<br>***Note:*** *When using **EAP-TLS**, **EAP-TTLS** or **PEAP** authority, at least one authority certificate will have to be installed in the **SSL** configuration that is able to verify the RADIUS server's certificate. In case of **EAP-TLS**, also a certificate and matching private key need to be configured to authenticate the PremierWave XN to the RADIUS server. For more information about SSL certificates see* *TLS (SSL) on page 92**.* |

| WLAN Profile WPA & WPA2 Settings | Description |
|---|---|
| **EAP-TTLS Option** | Select the inner authentication method to be used with EAP-TTLS (if configured).<br>◆ **EAP-MSCHAPv2**<br>◆ **MSCHAPv2**<br>◆ **MSCHAP**<br>◆ **CHAP**<br>◆ **PAP**<br>◆ **EAP-MD5** |
| **PEAP Option** | Select the inner authentication method to be used with EAP-PEAP (if configured).<br>◆ **EAP-MSCHAPv2**<br>◆ **EAP-MD5** |
| **Username** | User ID for identifying the PremierWave XN to the RADIUS server in the network |
| **Password** | Select the password for identifying the PremierWave XN to the RADIUS server in the network. |
| **Validate Certificate** | Select to **Enable** or **Disable**. If enabled, the PremierWave XN will attempt to validate the certificate received from the RADIUS server. |
| **Encryption** | Select one or more encryption types, listed from strongest to least strong. At least one selection will have to match the Access Points intended to connect with.<br>◆ **CCMP** = Uses AES as basis and is the strongest encryption option.<br>◆ **TKIP** = Uses WEP as the basis, but adds extra checks and variations for added protection.<br>◆ **WEP** = Based on RC4.<br>***Note:*** *In case the encryption settings on the Access Point(s) can still be chosen, the capabilities of the Access Point(s) and the other clients that need to use the network need to be taken into account.* |
| **Credentials** | Indicate the name of client certificate (required for EAP-TLS.) For more information about SSL certificates see sections, *TLS (SSL) on page 92*. |

## To Configure WLAN Profile WPA and WPA/IEEE802.11i Settings

### *Using Web Manager*

- To view or edit an existing WLAN Profile WPA setting, click **WLAN Profiles** on the menu, select an existing infrastructure profile and select **WPA** or **WPA2/IEEE802.11i** for the suite.

### *Using the CLI*

- To enter the wlan0 Profile WPAX command level: `enable -> config -> wlan profiles -> edit` <profile name or number> `-> advanced -> security -> wpax` or `enable -> config -> wlan profiles -> edit` <profile name or number> `-> security -> wpax`

### *Using XML*

- Include in your file:

  `<configgroup name="wlan profile" instance="`profile name`">`

  and

  `<configitem name="security">`

# WLAN Quick Connect

WLAN QuickConnect allows users to add a WLAN profile from a list of available networks auto-refreshed every 15 seconds. Details of the selected network are pre-populated, so little or no configuration is required by the user. Users can test the network connection before adding it to the pool of WLAN profiles.

***Table 6-13 WLAN Quick Connect***

| WLAN Quick Connect Settings | Description |
|---|---|
| **Network Name** (search field) | Enter a network name and click Scan to search for a network. |
| **Scan "<network SSID>"** | Perform a scan for devices within range of the PremierWave XN. Including the optional network SSID limits the scan to devices configured with the specified network SSID. Omitting the network SSID performs a scan for all devices in range.<br>***Note:*** *When the PremierWave is associated with an access point, scanning is only preformed on the band on which the unit is connected.* |
| **Refresh scan results every 15 seconds** (checkbox) | ◆ Check this to auto update the list of networks every 15 seconds.<br>◆ Uncheck this to stop auto update. |
| **Network Name** (link) | SSID of a network. Click this link to display its configuration profile. |
| **BSSID** | Basic service set identifier. This is a unique 48-bits address that identifies the access point that creates the wireless network. |
| **CH** | Channel number and frequency (MHz) of a network. |
| **RSSI** | An instantaneous value indicating the signal strength of the network. The best to worst signal strength is indicated by green, yellow and red respectively.<br>***Note:*** *RSSI reported in scan results is a single sampling, while the RSSI reported in the 'status' command (showing the signal strength of the currently connected AP) is averaged over time.* |
| **Security Suite** | Security suite of a network (E.g. WEP, WPA, WPA2, WPS, IBSS) |

## To Configure WLAN Quick Connect

### *Using Web Manager*

◆ To view or edit an existing WLAN Quick Connect settings, click **WLAN QuickConnect** on the menu.

# 7: Line and Tunnel Settings

The PremierWave XN The two lines . All lines use standard RS232/RS485 serial ports.

All lines can be configured to operate in the following modes:

- RS232
- RS485 Full Duplex (also compatible with RS-422)
- RS485 Half Duplex, with and without termination impedance
- All serial settings such as Baud Rate, Parity, Data Bits, etc, apply to these Lines.

## Line Settings

The Line Settings allow configuration of the serial lines (ports).

Some settings may be specific to only certain lines. Such settings are noted below.

***Table 7-1 Line Configuration Settings***

| Line Settings | Description |
|---|---|
| **Name** | Enter a name or short description for the line, if desired. By default, there is no name specified. A name that contains white space must be quoted. |
| **Interface** | Set the interface type for the Line. The default is **RS232** for Lines 1 and 2.<br>Choices are:<br>◆ **RS232** (Lines 1 and 2 only)<br>◆ **RS485 Full-Duplex** (Lines 1 and 2 only)<br>◆ **RS485 Half-Duplex** (Lines 1 and 2 only) |
| **Termination** | Select to **Enable** or **Disable** Line Termination. The default is **Disable**.<br>***Note:*** *This setting is only relevant for Lines 1 and 2 with Interface type RS485 Half-Duplex.* |
| **State** | Select to **Enable** or **Disable** the operational state of the Line. The default is **Enable**. |
| **Protocol** | Set the operational protocol for the Line. The default is **Tunnel**. Choices are:<br>◆ **None**<br>◆ **Tunnel** = Serial-Network tunneling protocol. |
| **Baud Rate** | Set the Baud Rate (speed) of the Line. The default is **9600**.<br>Any set speed between 300 and 921600 may be selected: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600. When selecting a Custom baud rate, you may manually enter any value between 300 and 5000000.<br>***Note:*** *Custom baud rates are not supported when a line is configured for Command Mode.* |
| **Parity** | ***Note:*** Set the Parity of the Line. The default is **None**. |
| **Data Bits** | ***Note:*** Set the number of data bits for the Line. The default is **8**. |
| **Stop Bits** | ***Note:*** Set the number of stop bits for the Line. The default is **1**. |
| **Flow Control** | ***Note:*** Set the flow control for the Line. The default is **None**. |

| Line Settings (continued) | Description |
|---|---|
| **Xon Char** | Set Xon Char to be used when Flow Control is set to Software. Prefix decimal with \ or prefix hexadecimal with 0x or prefix a single control character <control>. |
| **Xoff Char** | Set Xoff Char to be used when Flow Control is set to Software. Prefix decimal with \ or prefix hexadecimal with 0x or prefix a single control character <control>. |
| **Gap Timer** | Set the Gap Timer delay to Set the number of milliseconds to pass from the last character received before the driver forwards the received serial bytes. By default, the delay is four character periods at the current baud rate (minimum 1 msec). |
| **Threshold** | Set the number of threshold bytes which need to be received in order for the driver to forward received characters. |

***Table 7-2 Line Command Mode Settings***

| Line Command Mode Settings | Description |
|---|---|
| **Mode** | Set the Command Mode state of the Line. When in Command Mode, a CLI session operates exclusively on the Line. Choices are:<br>◆ **Always**<br>◆ **User Serial String**<br>◆ **Disabled**<br>***Note:*** *In order to enable Command Mode on the Line, Tunneling on the Line must be Disabled (both Connect and Accept modes). Also, custom baud rates are not supported in Command Mode.* |
| **Wait Time** | Enter the amount of time to wait during boot time for the Serial String. This timer starts right after the Signon Message has been set on the Serial Line and applies only if mode is "Use Serial String". |
| **Serial String** | Enter the Text or Binary string of bytes that must be read on the Serial Line during boot time in order to enable Command Mode. It may contain a time element to specify a required delay in milliseconds x, formed as {x}. Applies only if mode is "User Serial String". It may contain a binary character(s) of the form [x]. For example, use decimal [12] or hex [0xc]. |
| **Echo Serial String** | Select **Enable** or **Disable** for Echo Serial String. Applies only if mode is "User Serial String". Select enable to echo received characters backed out on the line while looking for the serial string. |
| **Signon Message** | Enter the string of bytes to be sent to the Serial Line during boot time. It may contain a binary character(s) of the form [x]. For example, use decimal [12] or hex [0xc]. |

## To Configure Line Settings

***Note:*** *The following section describes the steps to view and configure Line 1 settings; these steps apply to other line instances of the device.*

### *Using Web Manager*

- To configure a specific line, click **Line** in the menu and select **Line 1 -> Configuration** (Table 7-1).

- To configure a specific line in Command Mode, click **Line** in the menu and select **Line 1 -> Command Mode** (Table 7-2).

#### *Using the CLI*

- To enter Line 1 command level: `enable -> line 1`

#### *Using XML*

- Include in your file: `<configgroup name="line" instance="1">`
- Include in your file: `<configgroup name="serial command mode" instance="1">`

### To View Line Statistics

#### *Using Web Manager*

- To view statistics for a specific line, click **Line** in the menu and select **Line 1 -> Statistics**.

#### *Using the CLI*

- To view Line statistics: `enable -> line 1, show statistics`

#### *Using XML*

- Include in your file: `<statusgroup name="line" instance="1">`

## Tunnel Settings

Tunneling allows serial devices to communicate over a network, without "being aware" of the devices which establish the network connection between them. Tunneling parameters are configured using the Tunnel menu and submenus. The Tunnel settings allow you to configure how the Serial-Network tunneling operates. Tunneling is available on all serial lines. The connections on one serial line are separate from those on another serial port.

***Note:*** *The following section describes the steps to view and configure Tunnel 1 settings; these steps apply to other tunnel instances of the device.*

### Serial Settings

These serial settings for the tunnel apply to the Serial Line interface. The Line Settings and Protocol are displayed for informational purposes and must be configured from the Line settings.

***Table 7-3 Tunnel Serial Settings***

| Tunnel Serial Settings | Description |
|---|---|
| **Line Settings** | Line Settings information here is display only. Go to the section, *To Configure Line Settings* to modify these settings. |

| Tunnel Serial Settings (continued) | Description |
|---|---|
| **Protocol** | Protocol information here is display only. Go to the section, *To Configure Line Settings* to modify these settings. |
| **DTR** | Select the conditions in which the Data Terminal Ready (DTR) control signal on the serial line are asserted. Choices are:<br>◆ **Unasserted**<br>◆ **TruPort** = the DTR is asserted whenever either a connect or an accept mode tunnel connection is active with the Telnet Protocol RFC2217 saying that the remote DSR is asserted.<br>◆ **Asserted while connected** = the DTR is asserted whenever either a connect or an accept mode tunnel connection is active.<br>◆ **Continuously asserted** |

## To Configure Tunnel Serial Settings

### *Using Web Manager*

- To configure the Serial Settings for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Serial Settings**.

### *Using the CLI*

- To enter Tunnel 1 command level: `enable -> tunnel 1 -> serial`

### *Using XML*

- Include in your file: `<configgroup name="tunnel serial" instance="1">`

## Packing Mode

With Packing, data from the serial Line is not sent over the network immediately. Instead, data is queued and sent in segments, when either the timeout or byte threshold is reached. Packing applies to both Accept and Connect Modes.

***Table 7-4 Tunnel Packing Mode Settings***

| Tunnel Packing Mode Settings | Description |
|---|---|
| **Mode** | Configure the Tunnel Packing Mode. Choices are:<br>◆ **Disable** = Data not packed.<br>◆ **Timeout** = data sent after timeout occurs.<br>◆ **Send Character** = data sent when the Send Character is read on the Serial Line. |
| **Threshold** | Set the threshold (byte count). If the received serial data reaches this threshold, then the data will be sent on the network. Valid range is 100 to 1450 bytes. Default is 512. |
| **Timeout** | Set the timeout value, in milliseconds, after the first character is received on the serial line, before data is sent on the network. Valid range is 1 to 30000 milliseconds. Default is 1000. |

| Tunnel Packing Mode Settings (continued) | Description |
|---|---|
| **Send Character** | Enter Control Characters in any of the following forms:<br>◆ <control>J<br>◆ 0xA (hexadecimal)<br>◆ \10 (decimal)<br>If used, the Send Character is a single printable character or a control character that, when read on the Serial Line, forces the queued data to be sent on the network immediately. |
| **Trailing Character** | Enter Control Characters in any of the following forms:<br>◆ <control>J<br>◆ 0xA (hexadecimal)<br>◆ \10 (decimal).<br>If used, the Trailing Character is a single printable character or a control character that is injected into the outgoing data stream right after the Send Character. Disable the Trailing Character by blanking the field (setting it to <None>). |

## To Configure Tunnel Packing Mode Settings

### *Using Web Manager*

- To configure the Packing Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Packing Mode**.

### *Using the CLI*

- To enter the Tunnel 1 Packing command level: `enable -> tunnel 1 -> packing`

### *Using XML*

- Include in your file: `<configgroup name="tunnel packing" instance="1">`

## Accept Mode

In Accept Mode, the PremierWave XN listens (waits) for incoming connections from the network. A remote node on the network initiates the connection.

The configurable local port is the port the remote device connects to for this connection. There is no report port or address. Supported serial lines and associated local port numbers progress sequentially in matching value. For instance, the default local port is 10001 for serial line 1 and the default local port for serial line 2 is 10002, and so on for the number of serial lines supported.

Serial data can still be received while waiting for a network connection, keeping in mind serial data buffer limitations.

***Table 7-5 Tunnel Accept Mode Settings***

| Tunnel Accept Mode Settings | Description |
|---|---|
| **Mode** | Set the method used to start a tunnel in Accept mode. Choices are:<br>◆ **Disable** = do not accept an incoming connection.<br>◆ **Always** = accept an incoming connection (*default*).<br>◆ **Any Character** = start waiting for an incoming connection when any character is read on the serial line.<br>◆ **Start Character** = start waiting for an incoming connection when the start character for the selected tunnel is read on the serial line.<br>◆ **Modem Control Asserted** = start waiting for an incoming connection as long as the Modem Control pin (DSR) is asserted on the serial line until a connection is made.<br>◆ **Modem Emulation** = start waiting for an incoming connection when triggered by modem emulation AT commands. Connect mode must also be set to Modem Emulation. |
| **Local Port** | Set the port number for use as the network local port. The default local port number for each supported serial line number progresses sequentially in equal value so that Tunnel X : 1000X. For example:<br>◆ Tunnel 1 : 10001<br>◆ Tunnel 2 : 10002 |
| **Protocol** | Select the protocol type for use with Accept Mode:<br>◆ SSH<br>◆ SSL<br>◆ TCP (default protocol)<br>◆ TCP AES<br>◆ Telnet |
| **Credentials** | Specifies the name of the set of RSA and/or DSA certificates and keys to be used for the SSL connection. |
| **AES Encrypt Key** | Specify the text or hexadecimal advanced encryption standard (AES) key for encrypting outgoing data. |
| **AES Decrypt Key** | Specify the text or hexadecimal AES key for decrypting incoming data. |
| **TCP Keep Alive** | Enter the time, in milliseconds, the PremierWave waits during a silent connection before checking if the currently connected network device is still on the network. If the unit gets no response after 1 attempt, it drops the connection. Enter 0 to disable. |
| **Flush Serial** | Set whether the serial line data buffer is flushed upon a new network connection. Choices are:<br>◆ **Enabled** = serial data buffer is flushed on network connection<br>◆ **Disabled** = serial data buffer is not flushed on network connection (*default*) |
| **Block Serial** | Set whether Block Serial is enabled for debugging purposes. Choices are:<br>◆ **Enabled** = if Enabled, incoming characters from the serial line will not be forwarded to the network. Instead, they will be buffered and will eventually flow off the serial line if hardware or software flow control is configured.<br>◆ **Disabled** = this is the default setting; incoming characters from the Serial Line are sent on into the network. Any buffered characters are sent first. |

| Tunnel Accept Mode Settings (continued) | Description |
|---|---|
| **Block Network** | Set whether Block Network is enabled for debugging purposes. Choices are:<br>◆ **Enabled** = if Enabled, incoming characters from the network will not be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side.<br>◆ **Disabled** = this is the default setting; incoming characters from the network are sent on into the Serial Line. Any buffered characters are sent first. |
| **Password** | Enter a password. This password can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data transmission. The password sent to the unit must be terminated with one of the following:<br>◆ 0A (Line Feed)<br>◆ 00 (Null)<br>◆ 0D 0A (Carriage Return/Line Feed)<br>◆ 0D 00 (Carriage Return/Null)<br>If, **Prompt for Password** is set to Enabled and a password is provided, the user will be prompted for the password upon connection. |
| **Email on Connect** | Select an email profile number to which an email notification will be sent upon the establishment of an accept mode tunnel. |
| **Email on Disconnect** | Select an email profile number to which an email notification will be sent upon the disconnection of an accept mode tunnel. |

## To Configure Tunnel Accept Mode Settings

### *Using Web Manager*

- To configure the Accept Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Accept Mode**.

### *Using the CLI*

- To enter Tunnel 1 Accept Mode command level: `enable -> tunnel 1 -> accept`

### *Using XML*

- Include in your file: `<configgroup name="tunnel accept" instance="1">`

## Connect Mode

In Connect Mode, the PremierWave XCPremierWave XNPremierWave ENEDS-MD4/8/16 continues to attempt an outgoing connection on the network, until established. If the connection attempt fails or the connection drops, then it retries after a timeout. The remote node on the network must listen for the Connect Mode's connection.

For Connect Mode to function, it must be enabled, have a remote station (node) configured, and a remote port configured (TCP or UDP). When established, Connect Mode is always on. Enter the remote station as an IP address or DNS name. The PremierWave XCPremierWave XNPremierWave ENEDS-MD4/8/16 will not make a connection unless it can resolve the address.

For Connect Mode using UDP, the PremierWave XCPremierWave XNPremierWave ENEDS-MD4/8/16 accepts packets from any device on the network. It will send packets to the last device that sent it packets.

***Note:*** *The Port in Connect Mode is not the same port configured in Accept Mode.*

The TCP keepalive time is the time in which probes are periodically sent to the other end of the connection. This ensures the other side is still connected.

***Table 7-6 Tunnel Connect Mode Settings***

| Tunnel Connect Mode Settings | Description |
|---|---|
| **Mode** | Set the method to be used to attempt a connection to a remote host or device. Choices are:<br>◆ **Disable** = an outgoing connection is never attempted. (*default*)<br>◆ **Always** = a connection is attempted until one is made. If the connection gets disconnected, the PremierWave retries until it makes a connection.<br>◆ **Any Character** = a connection is attempted when any character is read on the serial line.<br>◆ **Start Character** = a connection is attempted when the start character for the selected tunnel is read on the serial line.<br>◆ **Modem Control Asserted** = a connection is attempted as long as the Modem Control pin (DSR) is asserted, until a connection is made.<br>◆ **Modem Emulation** = a connection is attempted when triggered by modem emulation AT commands. |
| **Local Port** | Enter an alternative Local Port. The Local Port is set to <Random> by default but can be overridden. Blank the field to restore the default. |
| **Host 1** | Click on the displayed information to expand it for editing. If <None> is displayed, clicking it will allow you to configure a new host. At least one Host is required to enable Connect Mode as this information is necessary to connect to that host. |
| **Reconnect Timer** | Set the value of the reconnect timeout (in milliseconds) for outgoing connections established by the device. Valid range is 1 to 65535 milliseconds. Default is 15000. |
| **Flush Serial Data** | Set whether the serial Line data buffer is flushed upon a new network connection. Choices are:<br>◆ **Enabled** = serial data buffer is flushed on network connection<br>◆ **Disabled** = serial data buffer is not flushed on network connection (*default*) |
| **Block Serial** | Set whether Block Serial is enabled for debugging purposes. Choices are:<br>◆ **Enabled** = If Enabled, incoming characters from the Serial Line will not be forwarded to the network. Instead, they will be buffered and will eventually flow off the Serial Line if hardware or software flow control is configured.<br>◆ **Disabled** = this is the default setting; incoming characters from the Serial Line are sent on into the network. Any buffered characters are sent first. |
| **Block Network** | Set whether Block Network is enabled for debugging purposes. Choices are:<br>◆ **Enabled** = If Enabled, incoming characters from the network will not be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side.<br>◆ **Disabled** = this is the default setting; incoming characters from the network are sent on into the Serial Line. Any buffered characters are sent first. |

| Tunnel Connect Mode Settings (continued) | Description |
|---|---|
| **Email on Connect** | Select an email profile number to which an email notification will be sent upon the establishment of an accept mode tunnel. |
| **Email on Disconnect** | Select an email profile number to which an email notification will be sent upon the disconnection of an accept mode tunnel. |

## To Configure Tunnel Connect Mode Settings

### *Using Web Manager*

- To configure the Connect Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Connect Mode**.

### *Using the CLI*

- To enter the Tunnel 1 Connect Mode command level: `enable -> tunnel 1 -> connect`

### *Using XML*

- Include in your file: `<configgroup name="tunnel connect" instance="1">`

## Disconnect Mode

Specifies the optional conditions for disconnecting any Accept Mode or Connect Mode connection that may be established. If any of these conditions are selected but do not occur and the network disconnects to the device, a Connect Mode connection will attempt to reconnect. However, if none of these conditions are selected, a closure from the network is taken as a disconnect.

***Table 7-7 Tunnel Disconnect Mode Settings***

| Tunnel Disconnect Mode Settings | Description |
|---|---|
| **Stop Character** | Enter the Stop Character which when received on the Serial Line, disconnects the tunnel. The Stop Character may be designated as a single printable character or as a control character. Control characters may be input in any of the following forms: <control>J or 0xA(hexadercimal) or \10 (decimal). Disable the Stop Character by blanking the field to set it to <None>. |
| **Modem Control** | Set whether Modem Control enables disconnect when the Modem Control pin is not asserted on the Serial Line. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Timeout** | Enter the number of milliseconds a tunnel may be idle before disconnection. The value of zero disables the idle timeout. |
| **Flush Serial Data** | Set whether to flush the Serial Line when the Tunnel is disconnected. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |

## To Configure Tunnel Disconnect Mode Settings

### *Using Web Manager*

- To configure the Disconnect Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Disconnect Mode**.

### *Using the CLI*

- To enter the Tunnel 1 Disconnect command level: `enable -> tunnel 1 -> disconnect`

### *Using XML*

- Include in your file: `<configgroup name="tunnel disconnect" instance="1">`

## Modem Emulation

Some older equipment is designed to attach to a serial port and dial into a network with a modem. This equipment uses AT commands to control the connection. For compatibility with these older devices on modern networks, our product mimics the behavior of the modem.

***Table 7-8 Tunnel Modem Emulation Settings***

| Tunnel Modem Emulation Settings | Description |
|---|---|
| **Echo Pluses** | Set whether the pluses will be echoed back during a "pause +++ pause" escape sequence on the Serial Line. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Echo Commands** | Set whether characters read on the Serial Line will be echoed, while the Line is in Modem Command Mode. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Verbose Response** | Set whether Modem Response Codes are sent out on the Serial Line. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Response Type** | Select a representation for the Modem Response Codes sent out on the Serial Line. Choices are:<br>◆ **Text** (ATV1) (default)<br>◆ **Numeric** (ATV0) |
| **Error Unknown Commands** | Set whether the Error Unknown Commands is enabled (ATU0) and ERROR is returned on the Serial Line for unrecognized AT commands. OTherwise (ATU1) OK is returned for unrecognized AT commands. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Incoming Connection** | Set how and if requests are answered after an incoming RING (ATS0=2). Choices are:<br>◆ **Disabled** (default)<br>◆ **Automatic**<br>◆ **Manual** |

| Tunnel Modem Emulation Settings | Description |
|---|---|
| **Connect String** | Enter the customized Connect String sent to the Serial Line with the Connect Modem Response Code. |
| **Display Remote IP** | Set whether the Display Remote IP is enabled so that the incoming RING sent on the Serial Line is followed by the IP address of the caller. Choices are:<br>◆ **Enabled**<br>◆ **Disabled** (default) |

## To Configure Tunnel Modem Emulation Settings

### *Using Web Manager*

- To configure the Modem Emulation for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Modem Emulation**.

### *Using the CLI*

- To enter the Tunnel 1 Modem command level: `enable -> tunnel 1 -> modem`

### *Using XML*

- Include in your file: `<configgroup name="tunnel modem" instance="1">`

## Statistics

Tunnel statistics contains data counters, error counters, connection time and connection information. Statistics are available at each individual connection and aggregated across all connections.

## To View Tunnel Statistics

### *Using Web Manager*

- To view statistics for a specific tunnel, click **Tunnel** in the menu and select the **Tunnel 1 -> Statistics**.

### *Using the CLI*

- To view Tunnel 1 statistics: `enable -> tunnel 1, show statistics`

### *Using XML*

- Include in your file: `<statusgroup name="tunnel" instance="1">s`

# 8: Terminal and Host Settings

Predefined connections are available via telnet, ssh, or a serial port. A user can choose one of the presented options and the device automatically makes the predefined connection.

Either the Telnet, SSH, or serial port connection can present the CLI or the Login Connect Menu. By default, the CLI is presented when the device is accessed. When configured to present the Login Connect Menu, the hosts configured via the Host selections, and named serial lines are presented.

## Terminal Settings

You can configure whether each serial line or the telnet/SSH server presents a CLI or a Login Connect menu when a connection is made.

***Table 8-1 Terminal on Network and Line Settings***

| Terminal on Network and Line Settings | Description |
|---|---|
| **Terminal Type** | Enter text to describe the type of terminal. The text will be sent to a host via IAC.<br>***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* **send break** *or* **start echoing**. |
| **Login Connect Menu** | Select the interface to display when the user logs in. Choices are:<br>◆ **Enabled** = shows the Login Connect Menu.<br>◆ **Disabled** = shows the CLI (default) |
| **Exit Connect Menu** | Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are:<br>◆ **Enabled** = a choice allows the user to exit to the CLI.<br>◆ **Disabled** = there is no exit to the CLI (default) |
| **Send Break** | Enter a Send Break control character, e.g., <control> Y, or blank to disable.<br>When the Send Break control character is received from the network on its way to the serial line, it is not sent to the line; instead, the line output is forced to be inactive (the break condition).<br>***Note:*** *This configuration option is only available for Line Terminals.* |
| **Break Duration** | Enter how long the break should last in milliseconds, up to 10000. Default is 500.<br>***Note:*** *This configuration option is only available for Line Terminals.* |
| **Echo** | Select whether to enable echo:<br>◆ Enabled<br>◆ Disabled<br>***Note:*** *Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable* ***Echo*** *if your terminal echoes, in which case you will see double of each character typed. Default is enabled.* |

### To Configure the Terminal Network Connection

#### *Using Web Manager*

- To configure the Terminal on Network, click **Terminal** on the menu and select **Network -> Configuration**.

#### *Using the CLI*

- To enter the Terminal Network command level: `enable -> config -> terminal network`

#### *Using XML*

- Include in your file: `<configgroup name="terminal" instance="network">`

### To Configure the Terminal Line Connection

***Note:*** *The following section describes the steps to view and configure Terminal 1 settings; these steps apply to other terminal instances of the device.*

#### *Using Web Manager*

- To configure a particular Terminal Line, click **Terminal** on the menu and select **Line 1 -> Configuration**.

#### *Using the CLI*

- To enter the Terminal Line command level: `enable -> config -> terminal 1`

#### *Using XML*

- Include in your file: `<configgroup name="terminal" instance="1">`

## Host Configuration

***Table 8-2 Host Configuration***

| Host Settings | Description |
|---|---|
| **Name** | Enter a name for the host. This name appears on the Login Connect Menu. To leave a host out of the menu, leave this field blank. |
| **Protocol** | Select the protocol to use to connect to the host. Choices are:<br>◆ **Telnet**<br>◆ **SSH**<br>***Note:*** *SSH keys must be loaded or created in SSH for the SSH protocol to work.* |

| Host Settings (continued) | Description |
|---|---|
| **SSH Username** | Enter a username to select a pre-configured Username/Password/ Key (configured on the SSH: Client Users), or leave it blank to be prompted for a username and password at connect time.<br>***Note:*** *This field appears if you selected SSH as the protocol.* |
| **Remote Address** | Enter an IP address for the host to which the device will connect. |
| **Remote Port** | Enter the port on the host to which the device will connect. |

## To Configure Host Settings

***Note:*** *The following section describes the steps to view and configure Host 1 settings; these steps apply to other host instances of the device.*

### *Using Web Manager*

- To configure a particular Host, click **Host** on the menu and select **Host 1 -> Configuration**.

### *Using the CLI*

- To enter the Host command level: `enable -> config -> host 1`

### *Using XML*

- Include in your file: `<configgroup name="host" instance="1">`

# 9: Services Settings

## DNS Settings

This section describes the active run-time settings for the domain name system (DNS) protocol. The primary and secondary DNS addresses come from the active interface. The static addresses from the Network Interface configuration settings may be overridden by DHCP.

***Note:*** *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

***Table 9-1 DNS Settings***

| Setting / Field | Description |
|---|---|
| **Lookup** | Perform one of the following:<br>◆ Enter an IP address, and perform a reverse Lookup to locate the hostname for that IP address<br>◆ Enter a hostname, and perform a forward Lookup to locate the corresponding IP address |

### To View or Configure DNS Settings:

#### *Using Web Manager*

- To view DNS current status, gclick **DNS** in the menu.
- To lookup DNS name or IP address, gclick **DNS** in the menu to access the **Lookup** field.

***Note:*** *To configure DNS for cases where it is not supplied by a protocol, gclick **Network** in the menu and select **Interface -> Configuration**.*

#### *Using the CLI*

- To enter the DNS command level: `enable -> dns`

#### *Using XML*

- Include in your file: `<configgroup name="interface" instance="eth0">`

# FTP Settings

The FTP protocol can be used to upload and download user files, and upgrade the PremierWave XN firmware. A configurable option is provided to enable or disable access via this protocol.

***Table 9-2*** **FTP Settings**

| FTP Settings | Description |
|---|---|
| **State** | Select to enable or disable the FTP server:<br>◆ **Enabled** (default)<br>◆ **Disabled** |

## To Configure FTP Settings

### *Using Web Manager*

◆ To configure FTP, gclick **FTP** in the menu.

### *Using the CLI*

◆ To enter the FTP command level: `enable -> config -> ftp`

### *Using XML*

◆ Include in your file: `<configgroup name="ftp server">`

# Syslog Settings

The Syslog information shows the current configuration and statistics of the syslog. Here you can configure the syslog host and the severity of the events to log.

***Note:*** *The system log is always saved to local storage, but it is not retained through reboots unless diagnostics logging to the filesystem is enabled. Saving the system log to a server that supports remote logging services (see RFC 3164) allows the administrator to save the complete system log history. The default port is 514.*

***Table 9-3 Syslog Settings***

| Syslog Settings | Description |
|---|---|
| **State** | Select to enable or disable the syslog:<br>◆ **Enabled**<br>◆ **Disabled** (default) |
| **Host** | Enter the IP address of the remote server to which system logs are sent for storage. |
| **Remote Port** | Enter the number of the port on the remote server that supports logging services. The default is 514. |

| Syslog Settings (continued) | Description |
|---|---|
| **Severity Log Level** | Specify the minimum level of system message the PremierWave should log. This setting applies to all syslog facilities. The drop-down list in the Web Manager is in descending order of severity (e.g., Emergency is more severe than Alert.) |

### To View or Configure Syslog Settings:

#### *Using Web Manager*

- To configure the Syslog, gclick **Syslog** in the menu.

#### *Using the CLI*

- To enter the Syslog command level: `enable -> config -> syslog`

#### *Using XML*

- Include in your file: `<configgroup name="syslog">`

## HTTP Settings

Hypertext Transfer Protocol (HTTP) is the transport protocol for communicating hypertext documents on the Internet. HTTP defines how messages are formatted and transmitted. It also defines the actions web servers and browsers should take in response to different commands. HTTP Authentication enables the requirement of usernames and passwords for access to the device.

***Table 9-4*** **HTTP Settings**

| HTTP Settings | Description |
|---|---|
| **State** | Select to enable or disable the HTTP server:<br>◆ **Enabled** (default)<br>◆ **Disabled** |
| **Port** | Enter the port for the HTTP server to use. The default is **80**. |
| **Secure Port** | Enter the port for the HTTPS server to use. The default is **443**. The HTTP server only listens on the **HTTPS Port** when an SSL certificate is configured. |
| **Secure Protocols** | Select to enable or disable the following protocols:<br>◆ **SSL3** = Secure Sockets Layer version 3<br>◆ **TLS1.0** = Transport Layer Security version 1.0. TLS 1.0 is the successor of SSL3 as defined by the IETF.<br>◆ **TLS1.1** = Transport Layer Security version 1.1<br>The protocols are enabled by default.<br>***Note:*** *A server certificate and associated private key need to be installed in the* **SSL** *configuration section to use* **HTTPS**. |
| **Secure Credentials** | Specify the name of the set of RSA and/or DSA certificates and keys to be used for the secure connection. |

| HTTP Settings (continued) | Description |
|---|---|
| **Max Timeout** | Enter the maximum time for the HTTP server to wait when receiving a request. This prevents Denial-of-Service (DoS) attacks. The default is **10** seconds. |
| **Max Bytes** | Enter the maximum number of bytes the HTTP server accepts when receiving a request. The default is **40** KB (this prevents DoS attacks). |
| **Logging State** | Select to enable or disable HTTP server logging:<br>◆ **Enabled** (default)<br>◆ **Disabled**<br>***Note:*** *You may need to increase this number in some cases where the browser is sending data aggressively within TCP windows size limit, when file (including firmware upgrade) is uploaded from webpage.* |
| **Max Log Entries** | Set the maximum number of HTTP server log entries. Only the last **Max Log Entries** are cached and viewable. |
| **Log Format** | Set the log format string for the HTTP server. Follow these **Log Format** rules:<br>◆ **%a** - remote IP address (could be a proxy)<br>◆ **%b** - bytes sent excluding headers<br>◆ **%B** - bytes sent excluding headers (0 = '-')<br>◆ **%h** - remote host (same as '%a')<br>◆ **%{h}i** - header contents from request (h = header string)<br>◆ **%m** - request method<br>◆ **%p** - ephemeral local port value used for request<br>◆ **%q** - query string (prepend with '?' or empty '-')<br>◆ **%t** - timestamp HH:MM:SS (same as Apache '%(%H:%M:%S)t' or '%(%T)t')<br>◆ **%u** - remote user (could be bogus for 401 status)<br>◆ **%U** - URL path info<br>◆ **%r** - first line of request (same as '%m %U%q <version>')<br>◆ **%s** - return status |
| **Authentication Timeout** | The timeout period applies if the selected authentication type is either **Digest** or **SSL/Digest**. After this period of inactivity, the client must authenticate again. |

## To Configure HTTP Settings

### *Using Web Manager*

- To configure HTTP settings, gclick **HTTP** in the menu and select **Configuration**.
- To view HTTP statistics, click **HTTP** in the menu and select **Statistics**.

### *Using the CLI*

- To enter the HTTP command level: `enable -> config -> http`

### *Using XML*

- Include in your file: `<configgroup name="http server">`

*Table 9-5* **HTTP Authentication Settings**

| HTTP Authentication Settings | Description |
|---|---|
| **URI** | Enter the Uniform Resource Identifier (URI).<br>***Note:*** *The URI must begin with '/' to refer to the filesystem.* |
| **Auth Type** | Select the authentication type:<br>◆ **None** = no authentication is necessary.<br>◆ **Basic** = encodes passwords using Base64.<br>◆ **Digest** = encodes passwords using MD5.<br>◆ **SSL** = can only be accessed over SSL (no password is required).<br>◆ **SSL/Basic** = is accessible only over SSL and encodes passwords using Base64.<br>◆ **SSL/Digest** = is accessible only over SSL and encodes passwords using MD5.<br>***Note:*** *When changing the parameters of Digest or SSL Digest authentication, it is often best to close and reopen the browser to ensure it does not attempt to use cached authentication information.* |

### To Configure HTTP Authentication

#### *Using Web Manager*

- To configure HTTP Authentication, gclick **HTTP** in the menu and select **Authentication**.

#### *Using the CLI*

- To enter the HTTP command level: `enable -> config -> http`

#### *Using XML*

- Include in your file: `<configgroup name="http authentication uri" instance="`uri name`">`

## RSS Settings

Really Simple Syndication (RSS) (sometimes referred to as Rich Site Summary) is a method of feeding online content to Web users. Instead of actively searching for configuration changes, RSS feeds permit viewing only relevant and new information regarding changes made via an RSS publisher. The RSS feeds may also be stored to the file system cfg_log.txt file.

*Table 9-6* **RSS Settings**

| RSS Settings | Description |
|---|---|
| **RSS Feed** | Select **On** or **Off** for RSS feeds to an RSS publisher. The default setting is off. |
| **Persistent** | Select **On** or **Off** for RSS feed to be written to a file (cfg_log.txt) and to be available across reboots. The default setting is off. |
| **Max Entries** | Set the maximum number of log entries. Only the last **Max Entries** are cached and viewable. |
| **View** | Click the button to view RSS feeds. |

| RSS Settings | Description |
|---|---|
| **Clear** | Click the button to clear RSS feed data.. |

## To Configure RSS Settings

### *Using Web Manager*

- To configure RSS, gclick **RSS** in the menu.

### *Using the CLI*

- To enter the RSS command level: `enable -> config -> rss`

### *Using XML*

- Include in your file: `<configgroup name="rss">`

# 10: Security Settings

The PremierWave XN device supports Secure Shell (SSH) and Secure Sockets Layer (SSL). SSH is a network protocol for securely accessing a remote device. SSH provides a secure, encrypted communication channel between two hosts over a network. It provides authentication and message integrity services.

Secure Sockets Layer (SSL) is a protocol that manages data transmission security over the Internet. It uses digital certificates for authentication and cryptography against eavesdropping and tampering. It provides encryption and message integrity services. SSL is widely used for secure communication to a web server. SSL uses certificates and private keys.

***Note:*** *The device supports SSLv3 and its successors, TLS1.0 and TLS1.1. An incoming SSLv2 connection attempt is answered with an SSLv3 response. If the initiator also supports SSLv3, SSLv3 handles the rest of the connection.*

## SSH Settings

SSH is a network protocol for securely accessing a remote device over an encrypted channel. This protocol manages the security of internet data transmission between two hosts over a network by providing encryption, authentication, and message integrity services.

Two instances require configuration: when the PremierWave is the SSH server and when it is an SSH client. The SSH server is used by the CLI (Command Mode) and for tunneling in Accept Mode. The SSH client is for tunneling in Connect Mode.

To configure the PremierWave as an SSH server, there are two requirements:

- **Defined Host Keys:** both private and public keys are required. These keys are used for the Diffie-Hellman key exchange (used for the underlying encryption protocol).
- **Defined Users:** these users are permitted to connect to the PremierWave SSH server.

### SSH Server Host Keys

The SSH Server Host Keys are used by all applications that play the role of an SSH Server. Specifically Tunneling in Accept Mode. These keys can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

***Note:*** *Some SSH Clients require RSA Host Keys to be at least 1024 bits in size.*

***Table 10-1 SSH Server Host Keys***

| RSS Settings | Description |
|---|---|
| **Private Key** | Enter the path and name of the existing private key you want to upload. In WebManager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network. |

| RSS Settings (continued) | Description |
|---|---|
| **Public Key** | Enter the path and name of the existing public key you want to upload. In WebManager, you can also browse to the public key to be uploaded. |
| **Key Type** | Select a key type to use for the new key:<br>◆ RSA<br>◆ DSA |
| **Bit Size** | Select a bit length for the new key:<br>◆ 512<br>◆ 768<br>◆ 1024 |

***Note:*** *SSH Keys from other programs may be converted to the required PremierWave format. Use Open SSH to perform the conversion.*

## SSH Client Known Hosts

The SSH Client Known Hosts are used by all applications that play the role of an SSH Client. Specifically Tunneling in Connect Mode. Configuring these public keys are optional but if they exist another layer of security is offered which helps prevent Man-in-the-Middle (MITM) attacks.

***Table 10-2 SSH Client Known Hosts***

| RSS Settings | Description |
|---|---|
| **Server** | Specify either a DNS Hostname or IP Address when adding public host keys for a Server. This Server name should match the name used as the Remote Address in Connect Mode Tunneling. |
| **Public RSA Key** | Enter the path and name of the existing public RSA key you want to use with this user. In WebManager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required. |
| **Public DSA Key** | Enter the path and name of the existing public DSA key you want to use with this user. In WebManager, you can also browse to the public DSA key to be uploaded.If authentication is successful with the key, no password is required. |

***Note:*** *These settings are not required for communication. They protect against Man-In-The-Middle (MITM) attacks.*

## SSH Server Authorized Users

The SSH Server Authorized Users are used by all applications that play the role of an SSH Server and specifically Tunneling in Accept Mode. Every user account must have a Password.

The user's Public Keys are optional and only necessary if public key authentication is wanted. Using public key authentication will allow a connection to be made without the password being asked at that time.

***Note:*** *When uploading the security keys, ensure the keys are not compromised in transit.*

*Table 10-3 SSH Server Authorized Users*

| RSS Settings | Description |
|---|---|
| **Username** | Enter a new username or edit an existing one. |
| **Password** | Enter a new password or edit an existing one. |
| **Public RSA Key** | Enter the path and name of the existing public RSA key you want to use with this user. In WebManager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required. |
| **Public DSA Key** | Enter the path and name of the existing public DSA key you want to use with this user. In WebManager, you can also browse to the public DSA key to be uploaded.If authentication is successful with the key, no password is required. |

## SSH Client Users

The SSH Client Users are used by all applications that play the role of an SSH Client. Specifically Tunneling in Connect Mode. To configure the PremierWave as an SSH client, an SSH client user must be both configured and also exist on the remote SSH server.

At the very least, a Password or Key Pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing Keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

The default Remote Command is '<Default login shell>' which tells the SSH Server to execute a remote shell upon connection. This can be changed to anything the SSH Server on the remote host can execute.

***Note:*** *If you are providing a key by uploading a file, make sure that the key is not password protected.*

*Table 10-4 SSH Client Users*

| RSS Settings | Description |
|---|---|
| **Username** | Enter the name that the device uses to connect to an SSH server. |
| **Password** | Enter the password associated with the username. |
| **Remote Command** | Enter the command that can be executed remotely. Default is shell, which tells the SSH server to execute a remote shell upon connection. This command can be changed to anything the remote host can perform. |
| **Private Key** | Enter the path and name of the existing private key you want to upload. In WebManager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network. |
| **Public Key** | Enter the path and name of the existing public key you want to upload. In WebManager, you can also browse to the public key to be uploaded. |
| **Key Type** | Select a bit length for the key:<br>◆ RSA<br>◆ DSA |

| RSS Settings (continued) | Description |
|---|---|
| **Bit Size** | Select the bit length of the new key:<br>◆ 512<br>◆ 768<br>◆ 1024<br>Using a larger Bit Size takes more time to generate the key. Approximate times are:<br>◆ 1 second for a 512 bit RSA key<br>◆ 1 second for a 768 bit RSA key<br>◆ 1 second for a 1024 bit RSA key<br>◆ 2 seconds for a 512 bit DSA key<br>◆ 2 seconds for a 768 bit DSA key<br>◆ 20 seconds for a 1024 bit DSA key<br>***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 2048 bits long.* |

### To Configure SSH Settings

#### *Using Web Manager*

- To configure SSH, gclick SSH in the menu.

#### *Using the CLI*

- To enter the SSH command level: `enable -> ssh`

#### *Using XML*

- Include in your file: `<configitem name="ssh username">`

## SSL Settings

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmission over the Internet. It provides encryption, authentication, and message integrity services. SSL is widely used for secure communication to a web server, and also for wireless authentication.

Certificate/Private key combinations can be obtained from an external Certificate Authority (CA) and uploaded into the unit. Self-signed certificates with associated private key can be generated by the device server itself.

***Note:*** *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

## Certificate and Key Generation

The PremierWave XN can generate self signed certificates and their corresponding keys. This can be done for both the rsa and dsa certificate formats. Certificates can be identified on the PremierWave XN by a name provided at generation time.

***Table 10-5 Certificate and Key Generation Settings***

| Certificate Generation Settings | Description |
|---|---|
| **Country (2 Letter Code)** | Enter the 2-letter country code to be assigned to the new self-signed certificate.<br>Examples: US for United States and CA for Canada |
| **State/Province** | Enter the state or province to be assigned to the new self-signed certificate. |
| **Locality (City)** | Enter the city or locality to be assigned to the new self-signed certificate. |
| **Organization** | Enter the organization to be associated with the new self-signed certificate. |
| **Organization Unit** | Enter the organizational unit to be associated with the new self-signed certificate. |
| **Common Name** | Enter the common name to be associated with the new self signed certificate. Note that this is a required field. |
| **Expires** | Enter the expiration date, in mm/dd/yyyy format, for the new self-signed certificate.<br>Example: An expiration date of May 9, 2012 is entered as 05/09/2012. |
| **Key length** | Select the bit size of the new self-signed certificate. Choices are:<br>◆ 512 bits<br>◆ 768 bits<br>◆ 1024 bits<br>◆ 2048 bits<br><br>The larger the bit size, the longer it takes to generate the key. |
| **Type** | Select the type of key:<br>◆ **RSA** = Public-Key Cryptography algorithm based on large prime numbers, invented by Rivest Shamir and Adleman. Used for encryption and signing.<br>◆ **DSA** = Digital Signature Algorithm also based on large prime numbers, but can only be used for signing. Developed by the US government to avoid the patents on RSA. |

## To Create a New Credential

### *Using Web Manager*

- To create a new credential, gclick **SSL** in the menu and select **Credentials**.

### *Using the CLI*

- To enter the SSL command level: `enable -> ssl`
- To enter the Credentials command level: `enable -> ssl -> credentials`

### Using XML

- Not applicable.

## Certificate Upload Settings

SSL certificates identify the PremierWave XN to peers, and can be used with some methods of wireless authentication. Certificate and key pairs can be uploaded to the PremierWave XN through either the CLI or XML import mechanisms. Certificates can be identified on the PremierWave XN by a name provided at upload time.

***Table 10-6 Upload Certificate Settings***

| Upload Certificate Settings | Description |
|---|---|
| **New Certificate** | SSL certificate to be uploaded.<br>RSA or DSA certificates are allowed.<br>The format of the certificate must be PEM. It must start with "`-----BEGIN CERTIFICATE-----`" and end with "`-----END CERTIFICATE-----`". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload. |
| **New Private Key** | The key needs to belong to the certificate entered above.<br>The format of the file must be PEM. It must start with "`-----BEGIN RSA PRIVATE KEY-----`" and end with "`-----END RSA PRIVATE KEY-----`". Read DSA instead of RSA in case of a DSA key. Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload. |

## To Configure an Existing SSL Credential

### Using Web Manager

- To configure an existing SSL Credential, gclick **SSL** in the menu and select **Credentials**.

### Using the CLI

- To enter the SSL command level: `enable -> ssl`
- To enter the Credential command level: `enable -> ssl -> credentials`

### Using XML

- Include in your file:

  `<configgroup name="ssl">`

  and `<configitem name="credentials" instance="name">`

  and `<value name="RSA certificate"/>` or `<value name="DSA certificate"/>`

## Trusted Authorities

One or more authority certificates are needed to verify a peer's identity. Authority certificates are used with some wireless authentication methods. These certificates do not require a private key.

***Table 10-7 Trusted Authority Settings***

| Trusted Authorities Settings | Description |
|---|---|
| **Authority** | SSL authority certificate.<br><br>RSA or DSA certificates are allowed.<br><br>The format of the authority certificate can be PEM or PKCS7. PEM files must start with "`-----BEGIN CERTIFICATE-----`" and end with "`-----END CERTIFICATE-----`". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload. |

## To Upload an Authority Certificate

### *Using Web Manager*

- To upload an Authority Certificate, gclick **SSL** in the menu and select **Trusted Authorities**.

### *Using the CLI*

- To enter the SSL command level: `enable -> ssl`
- To enter the Trusted Authorities command level: `enable -> ssl -> trusted authorities`

### *Using XML*

- Include in your file:

  `<configgroup name="ssl">`

  and `<configitem name="trusted authority" instance ="1">`

  and `<configitem name="intermediate authority" instance="1">`

# 11: Maintenance and Diagnostics Settings

## Filesystem Settings

Use the file system to list, view, add, remove, and transfer files. The PremierWave XN uses a flash file system to store.

### File Display

It is possible to view the list of existing files, and to view their contents in the ASCII or hexadecimal formats.

***Table 11-1 File Display Settings***

| File Display Commands | Description |
|---|---|
| **ls** | Displays a list of files on the PremierWave, and their respective sizes. |
| **cat** | Displays the specified file in ASCII format. |
| **dump** | Displays the specified file in a combination of hexadecimal and ASCII formats. |
| **pwd** | Print working directory. |
| **cd** | Change directories. |
| **show tree** | Display file/directory tree. |

### To Display Files

#### *Using Web Manager*

- To view existing files and file contents, gclick **FIlesystem** in the menu and select **Browse**.

#### *Using the CLI*

- To enter the Filesystem command level: `enable -> filesystem`

#### *Using XML*

- Not applicable.

## File Modification

The PremierWave XN allows for the creation and removal of files on its filesystem.

***Table 11-2 File Modification Settings***

| File Modification Commands | Description |
|---|---|
| **rm** | Removes the specified file from the file system. |
| **touch** | Creates the specified file as an empty file. |
| **cp** | Creates a copy of a file. |
| **mkdir** | Creates a directory on the file system. |
| **rmdir** | Removes a directory from the file system. |
| **format** | Format the file system and remove all data. |

## File Transfer

Files can be transferred to and from the PremierWave XN via the TFTP protocol. This can be useful for saving and restoring XML configuration files. Files can also be uploaded via HTTP.

***Table 11-3 File Transfer Settings***

| File Transfer Settings | Description |
|---|---|
| **Create** | Browse to location of the file to be created. |
| **Upload File** | Browse to location of the file to be uploaded. |
| **Copy File** | Enter the source and destination for file to be copied. |
| **Move** | Enter the source and destination for file to be moved. |
| **Action** | Select the action that is to be performed via TFTP:<br>◆ **Get** = a “get” command will be executed to store a file locally.<br>◆ **Put** = a “put” command will be executed to send a file to a remote location. |
| **Local File** | Enter the name of the local file on which the specified “get” or “put” action is to be performed. |
| **Remote File** | Enter the name of the file at the remote location that is to be stored locally (“get’) or externally (“put”). |
| **Host** | Enter the IP address or name of the host involved in this operation. |
| **Port** | Enter the number of the port involved in TFTP operations. |

### To Transfer or Modify Filesystem Files

#### *Using Web Manager*

- To create a new file or directory, upload an existing file, copy or move a file, click **Filesystem** in the menu and select **Browse**.

#### *Using the CLI*

- To enter the Filesystem command level: `enable -> filesystem`

#### *Using XML*

- Not applicable.

## Protocol Stack Settings

There are various low level network stack specific items that are available for configuration. This includes settings related to IP, ICMP, ARP and SMTP, which are described in the sections below.

### IP Settings

***Table 11-4*** **IP Network Stack Settings**

| Protocol Stack IP Settings | Description |
|---|---|
| **IP Time to Live** | This value typically fills the Time To Live in the IP header. SNMP refers to this value as "ipDefaultTTL".<br>Enter the number of hops to be transmitted before the packet is discarded. |
| **Multicast Time to Live** | This value fills the Time To Live in any multicast IP header. Normally this value will be one so the packet will be blocked at the first router. It is the number of hops allowed before a Multicast packet is discarded.<br>Enter the value to be greater than one to intentionally propagate multicast packets to additional routers. |

### To Configure IP Network Stack Settings

#### *Using Web Manager*

- To configure IP protocol settings, gclick **Protocol Stack** in the menu and select **IP**.

#### *Using the CLI*

- To enter the command level: `enable -> config -> ip`

#### *Using XML*

- Include in your file: `<configgroup name="ip">`

## ICMP Settings

*Table 11-5 ICMP Network Stack Settings*

| Protocol Stack ICMP Settings | Description |
|---|---|
| **State** | The State selection is used to turn on/off processing of ICMP messages. This includes both incoming and outgoing messages. Choose **Enabled** or **Disabled**. |

## To Configure ICMP Network Stack Settings

### *Using Web Manager*

- To configure ICMP protocol settings, gclick **Protocol Stack** in the menu and select **ICMP**.

### *Using the CLI*

- To enter the command level: `enable -> config -> icmp`

### *Using XML*

- Include in your file: `<configgroup name="icmp">`

## ARP Settings

*Table 11-6 ARP Network Stack Settings*

| Protocol Stack ARP Settings | Description |
|---|---|
| **IP Address** | Enter the IP address to add to the ARP cache. |
| **MAC Address** | Enter the MAC address to add to the ARP cache. |

## To Configure ARP Network Stack Settings

### *Using Web Manager*

- To configure ARP protocol settings, gclick **Protocol Stack** in the menu and select **ARP**.

### *Using the CLI*

- To enter the command level: `enable -> config -> arp`

### *Using XML*

- Include in your file: `<configgroup name="arp">`

## SMTP Settings

*Table 11-7 SMTP Network Stack Settings*

| Protocol Stack SMTP Settings | Description |
|---|---|
| **Relay Address** | Address of all outbound email messages through a mail server. Can contain either a hostname or an IP address. |
| **Relay Port** | Port utilized for the delivery of outbound email messages. |

### To Configure SMTP Network Stack Settings

#### *Using Web Manager*

- To configure SMTP protocol settings, gclick **Protocol Stack** in the menu and select **SMTP**.

#### *Using the CLI*

- To enter the command level: `enable -> config -> smtp`

#### *Using XML*

- Include in your file: `<configgroup name="smtp">`

# Query Port

The query port (UDP port 0x77FE) is used for the automatic discovery of the device by the DeviceInstaller utility. Only 0x77FE discover messages from DeviceInstaller are supported. For more information on DeviceInstaller, see *Chapter 4: Using DeviceInstaller on page 25*.

*Table 11-8 Query Port Settings*

| Query Port Settings | Description |
|---|---|
| **State** | Enables or disables listening and responding to query port messages. Select On or Off. |

### To Configure Query Port Settings

#### *Using Web Manager*

- To view Query Port settings or to switch the Query Port Server on or off, gclick **Query Port** in the menu.

#### *Using the CLI*

- To enter the Query Port command level: `enable -> config -> query port`

#### *Using XML*

- Include in your file:

  ```
  <configgroup name="query port">
  ```

  and

  ```
  <configitem name="state">
  ```

# Diagnostics

The PremierWave XN has several tools for diagnostics and statistics. Various options allow for the configuration or viewing of IP socket information, ping, traceroute, memory, and processes.

## Hardware

## To View Hardware Information

#### *Using Web Manager*

- To view hardware information, gclick **Diagnostics** in the menu and select **Hardware**.

#### *Using the CLI*

- To enter the command level: `enable -> device, show hardware information`

#### *Using XML*

- Include in your file: `<statusgroup name="hardware">`

## IP Sockets

You can view the list of listening and connected IP sockets.

## To View the List of IP Sockets

#### *Using Web Manager*

- To view IP Sockets, gclick **Diagnostics** in the menu and select **IP Sockets**.

#### *Using the CLI*

- To enter the command level: `enable, show ip sockets`

#### *Using XML*

- Include in your file: `<statusgroup name="ip sockets">`

## Ping

The ping command can be used to test connectivity to a remote host.

*Table 11-9 Ping Settings*

| Diagnostics: Ping Settings | Description |
|---|---|
| **Host** | Enter the IP address or host name for the PremierWave to ping. |
| **Count** | Enter the number of ping packets PremierWave should attempt to send to the **Host**. The default is **5**. |
| **Timeout** | Enter the time, in seconds, for the PremierWave to wait for a response from the host before timing out. The default is **5** seconds. |

## To Ping a Remote Host

### *Using Web Manager*

- To ping a Remote Host, gclick **Diagnostics** in the menu and select **Ping**.

### *Using the CLI*

- To enter the command level: `enable`

### *Using XML*

- Not applicable.

## Traceroute

Here you can trace a packet from the PremierWave XN to an Internet host, showing how many hops the packet requires to reach the host and how long each hop takes. If you visit a web site whose pages appear slowly, you can use traceroute to determine where the longest delays are occurring.

*Table 11-10 Traceroute Settings*

| Diagnostics: Traceroute Settings | Description |
|---|---|
| Host | Enter the IP address or DNS hostname. This address is used to show the path between it and the PremierWave when issuing the traceroute command. |
| Protocol | Specify the traceroute protocol. |

## To Perform a Traceroute

### *Using Web Manager*

- To perform a Traceroute, gclick **Diagnostics** in the menu and select **Traceroute**.

### *Using the CLI*

- To enter the command level: `enable`

### *Using XML*

- Not applicable.

## Log

*Table 11-11 Log Settings*

| Diagnostics: Log | Description |
|---|---|
| **Output** | Select a diagnostic log output type:<br>◆ Disable - Turn off the login feature.<br>◆ Filesystem - Directs logging to /log.txt.<br>◆ Line (1 or 2 ) - Directs logging to the selected serial line. |
| **Max Length** | Set the maximum length of the log.txt file.<br>***Note:*** *This setting becomes available when Filesystem is selected.* |

## To Configure the Diagnostic Log Output

### *Using Web Manager*

◆ To configure the Diagnostic Log output, gclick **Diagnostics** in the menu and select **Log**.

### *Using the CLI*

◆ To enter the command level: `enable -> config -> diagnostics -> log`

### *Using XML*

◆ Include in your file:

```
<configgroup name="diagnostics">
```

and

```
<configitem name="log">
```

## Memory

The memory information shows the total, used, and available memory (in kilobytes).

## To View Memory Usage

### *Using Web Manager*

◆ To view memory information, gclick **Diagnostics** in the menu and select **Memory**.

### *Using the CLI*

◆ To enter the command level: `enable -> device, show memory`

### *Using XML*

◆ Include in your file: `<statusgroup name="memory">`

### Processes

The PremierWave XN Processes information shows all the processes currently running on the system. It shows the Process ID (PID), Parent Process ID (PPID), user, CPU percentage, percentage of total CPU cycles, and process command line information.

### To View Process Information

#### *Using Web Manager*

- To view process information, gclick **Diagnostics** in the menu and select **Processes**.

#### *Using the CLI*

- To enter the command level: `enable, show processes`

#### *Using XML*

- Include in your file: `<statusgroup name="processes">`

## Threads

The PremierWave Threads information shows details of threads in the ltrx_evo task which can be useful for technical experts in debugging.

### To View Thread Information

#### *Using Web Manager*

- To view thread information, gclick **Diagnostics** in the menu and select **Threads**.

#### *Using the CLI*

- To enter the command level: `enable -> device, show task state`

# System Settings

The PremierWave XN System settings allow for rebooting the device, restoring factory defaults, uploading new firmware and updating a system's short and long name.

***Note:*** *Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

***Table 11-12 System Settings***

| System Settings | Description |
|---|---|
| **Reboot Device** | Reboots the device. |
| **Restore Factory Defaults** | Restores the device to the original factory settings. All configuration will be lost. The PremierWave automatically reboots upon setting back to the defaults. |
| **Upload New Firmware** | FTP to the PremierWave. Write the new firmware file to firmware.rom on the PremierWave. The device automatically reboots upon the installation of new firmware. See the section, *FTP Settings on page 61*. |
| **Short Name** | Enter a short name for the system name. A maximum of 32 characters are allowed. |
| **Long Name** | Enter a long name for the system name. A maximum of 64 characters are allowed. |

## To Reboot or Restore Factory Defaults

### *Using Web Manager*

- To access the area with options to reboot, restore to factory defaults, upload new firmware, update the system name (long or short names) or to view the current configuration, gclick **System** in the menu.

### *Using the CLI*

- To enter the command level: `enable`

### *Using XML*

- Include in your file: `<configgroup name="xml import control">`

# 12: Advanced Settings

## Email Settings

View and configure email alerts relating to events occurring within the system.

***Table 12-1*** **Email Configuration**

| Email – Configuration Settings | Description |
|---|---|
| **To** | Enter the email address to which the email alerts will be sent. Multiple addresses are separated by semicolon (;). Required field if an email is to be sent. |
| **CC** | Enter the email address to which the email alerts will be copied. Multiple addresses are separated by semicolon (;). |
| **From** | Enter the email address to list in the From field of the email alert. Required field if an email is to be sent. |
| **Reply-To** | Enter the email address to list in the Reply-To field of the email alert. |
| **Subject** | Enter the subject for the email alert. |
| **Message File** | Enter the path of the file to send with the email alert. This file appears within the message body of the email. |
| **Overriding Domain** | Enter the domain name to override the current domain name in EHLO (Extended Hello). |
| **Server Port** | Enter the SMTP server port number. The default is port **25**. |
| **Local Port** | Enter the local port to use for email alerts. The default is a random port number. |
| **Priority** | Select the priority level for the email alert:<br>◆ Urgent<br>◆ High<br>◆ Normal<br>◆ Low<br>◆ Very Low |

### To View, Configure and Send Email

***Note:*** *The following section describes the steps to view and configure Email 1 settings; these steps apply to other emails available for the device.*

#### *Using Web Manager*

- To view Email statistics, click **Email** in the menu and select **Email 1 -> Statistics**.
- To configure basic Email settings, gclick **Email** in the menu and select **Email 1 -> Configuration**.
- To send an email, gclick **Email** in the menu and select **Email 1 -> Send Email**.\

#### *Using the CLI*

- To enter Email command level: `enable -> email 1`

#### *Using XML*

- Include in your file: `<configgroup name="email" instance="1">`

## Command Line Interface Settings

The Command Line Interface settings allow you to control how users connect to and interact with the PremierWave XN's command line. It is possible to configure access via the Telnet and SSH protocols, in addition to general CLI options.

### Basic CLI Settings

The basic CLI settings control general CLI access and usability options.

***Table 12-2 CLI Configuration Settings***

| Command Line Interface Configuration Settings | Description |
|---|---|
| **Login Password** | Enter the password for logins by the admin account. The default password is "PASS". |
| **Enable Level Password** | Enter the password for access to the Command Mode Enable level. There is no password by default. |
| **Quit Connect Line** | Set the string used to terminate a connect line session and resume the CLI. Type <control> before any key to be pressed while holding down the Ctrl key, for example, <control>L. |
| **Quit Connect Line** | Enter the **Quit Connect Line** string to be used to terminate a telnet or SSH session and resume the CLI. Type <control> before the key to be pressed while holding down the [Ctrl] key (example: <control>L>. |
| **Inactivity Timeout** | Set a time period in which the CLI session should disconnect if no data is received. Enter 0 to disable. Blank the display field to restore the default. |
| **Line Authentication** | **Enable** or **Disable** authentication for CLI access on the serial lines. |

### To View and Configure Basic CLI Settings

#### *Using Web Manager*

- To view CLI statistics, gclick **CLI** in the menu and select **Statistics**.
- To configure basic CLI settings, gclick **CLI** in the menu and select **Configuration**.

#### *Using the CLI*

- To enter CLI command level: `enable -> config -> cli`

### Using XML

Include in your file: `<configgroup name="cli">`

## Telnet Settings

The telnet settings control CLI access to the PremierWave XN over the Telnet protocol.

***Table 12-3 Telnet Settings***

| Telnet Settings | Description |
|---|---|
| **Telnet State** | **Enable** or **Disable** CLI access via telnet |
| **Telnet Port** | Enter an alternative Telnet Port to override the default used by the CLI server. Blank the field to restore the default. |
| **Telnet Max Sessions** | Specify the maximum number of concurrent Telnet sessions that will be allowed. |
| **Telnet Authentication** | **Enable** or **Disable** authentication for telnet logins. |

## To Configure Telnet Settings

### Using Web Manager

- To configure Telnet settings, gclick **CLI** in the menu and select **Configuration**.

### Using the CLI

- To enter the Telnet command level: `enable -> config -> cli -> telnet`

### Using XML

- Include in your file:

  `<configgroup name="telnet">`

  and

  `<configitem name="state">`

  and

  `<configitem name="authentication">`

## SSH Settings

The SSH settings control CLI access to the PremierWave XN over the SSH protocol.

***Table 12-4 SSH Settings***

| SSH Settings | Description |
|---|---|
| **SSH State** | Select to **Enable** or **Disable** CLI access via telnet. |
| **SSH Port** | Specify the SSH Port and override the default, as needed. Blank the field to restore the default. |
| **SSH Max Sessions** | Specify the maximum number of concurrent SSH sessions that will be allowed. |

### To Configure SSH Settings

#### *Using Web Manager*

- To configure SSH settings, gclick **CLI** in the menu and select **Configuration**.

#### *Using the CLI*

- To enter the SSH command level: `enable -> config -> cli -> ssh`

#### *Using XML*

- Include in your file:

  ```
  <configgroup name="ssh">
  ```

  and

  ```
  <configitem name="state">
  ```

## XML Settings

The PremierWave XN allows for the configuration of units using an XML configuration record (XCR). Export a current configuration for use on other PremierWave XN or import a saved configuration file.

### XML: Export Configuration

You can export the current system configuration in XML format. The generated XML file can be imported later to restore a configuration. It can also be modified and imported to update the configuration on this PremierWave XN unit or another. The XML data can be dumped to the screen or exported to a file on the file system.

By default, all groups are exported. You may also select a subset of groups to export.

***Table 12-5 XML Exporting Configuration***

| XML Export Configuration Settings | Description |
|---|---|
| **Export to browser** | Select this option to export the XCR data in the selected fields to the browser. Use the "xcr dump" command to export the data to the browser. |
| **Export to local file** | Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record. Use the "xcr export" command to export the data to a local file. |
| **Export secrets** | Select to export secret password and key information. Use only with a secure link, and save only in secure locations.<br>***Note:*** *Only use with extreme caution.* |
| **Comments** | Select this option to include descriptive comments in the XML. |

| XML Export Configuration Settings (continued) | Description |
|---|---|
| **Lines to Export** | Select instances to be exported in the line, serial, tunnel and terminal groups. |
| **Groups to Export** | Check the configuration groups that are to be exported to the XML configuration record. The group list should be comma delimited and encased in double quotes. The list of available groups can be viewed with the “xcr list” command. |

## To Export Configuration in XML Format

### *Using Web Manager*

- To export configuration format, gclick **XML** in the menu and select **Export Configuration**.

### *Using the CLI*

- To enter the XML command level: `enable -> xml`

### *Using XML*

- Not applicable.

## XML: Export Status

You can export the current status in XML format. By default, all groups are exported. You may also select a subset of groups to export.

***Table 12-6 Exporting Status***

| XML Export Status Settings | Description |
|---|---|
| **Export to browser** | Select this option to export the XCR data in the selected fields to the browser. Use the “xcr dump” command to export the data to the browser. |
| **Export to local file** | Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record. Use the “xcr export” command to export the data to a local file. |
| **Lines to Export** | Select instances to be exported in the line, serial, tunnel and terminal groups. |
| **Groups to Export** | Check the configuration groups that are to be exported to the XML configuration record. The group list should be comma delimited and encased in double quotes. The list of available groups can be viewed with the “xcr list” command. |

## To Export in XML Format

### *Using Web Manager*

- To export configuration format, gclick **XML** in the menu and select **Export Status**.

### *Using the CLI*

- To enter the XML command level: `enable -> xml`

### *Using XML*

- Not applicable.

## XML: Import Configuration

Here you can import a system configuration from an XML file.

The XML data can be imported from a file on the file system or pasted into a CLI session. The groups to import can be specified at the command line, the default is all groups.

## Import Configuration from External File

This import option requires entering the path and file name of the external XCR file you want to import.

## Import Configuration from the Filesystem

This import option picks up settings from a file and your import selections of groups, lines, and instances. The list of files can be viewed from the filesystem level of the CLI.

***Table 12-7 Import Configuration from Filesystem Settings***

| Import Configuration from Filesystem Settings | Description |
|---|---|
| **Filename** | Enter the name of the file on the PremierWave (local to its filesystem) that contains XCR data. |
| **Lines to Import** | Select filter instances to be imported in the line, serial, tunnel and terminal groups. This affects both Whole Groups to Import and Text List selections. |
| **Whole Groups to Import** | Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group. |
| **Text List** | Enter the string to import specific instances of a group. The textual format of this string is: `<g>:<i>;<g>:<i>;...`<br>Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance then only the group name <g> should be specified. |

## To Import Configuration in XML Format

### *Using Web Manager*

- To import configuration, gclick **XML** in the menu and select **Import Configuration**.

### *Using the CLI*

- To enter the XML command level: `enable -> xml`

### *Using XML*

- Not applicable.

# 13: Bridging

PremierWave XN supports bridging of traffic between a single external Ethernet device and the wireless network. When bridging is enabled and active, the MAC address of the external device is used as the MAC address for the WLAN interface. The PremierWave XN then bridges traffic between the two interfaces. The external Ethernet device appears as a wireless node on the network.

When bridging is enabled, the concept of the Primary Interface is introduced. The Primary Interface is the interface over which all device features and services operate, as if bridging were not enabled. FTP, Telnet/SSH CLI, HTTP, 77FE, etc, all may be accessed as usual over the Primary Interface. The Primary Interface dynamically switches between eth0 and wlan0, depending on the state of the Ethernet physical link. If the Ethernet link is up, eth0 is the Primary Interface; otherwise, wlan0 is the Primary Interface.

When bridging is enabled, operation of Network 1 (eth0) and Network 2 (wlan0) are overridden and controlled by the bridging subsystem. Each Network Interface's own configuration is used when it becomes the Primary Interface. Network 1 (eth0) and Network 2 (wlan0) Link Configuration settings are still used to configure and control the physical links.

## Bridging Configuration

### To configure and enable bridging:

1. Configure Network 1 (eth0) and Network 2 (wlan0) Interface settings, which will be used for the Primary Interface. For example,
   - DHCP Disabled
   - IP Address 192.168.1.100/24
   - Default Gateway 192.168.1.1
2. Configure Network 1 (eth0) Link settings, if desired. These include the Ethernet link speed and duplex.
3. Configure Network 2 (wlan0) Link settings as desired for connection to a wireless network. Primarily, configure the WLAN Profile(s) for connection to the wireless network.
4. Create the corresponding WLAN Profile(s) under WLAN Profiles.

   At this point, it is a good idea to ensure that the PremierWave XN can connect to your wireless network, before enabling bridging. Check your WLAN settings by continuing with the following steps:
5. Enable Network 2 (wlan0) and Disable Network 1 (eth0).
6. Configure Network 2 (wlan0) Interface settings as desired.
7. Reboot.
8. Verify the wireless connection.
9. Enable Bridge 1 (br0).
10. Optionally configure the Bridge 1 Bridging MAC Address.
11. Reboot for changes to take effect.

# Bridging Operation

During initialization, both eth0 and wlan0 are enabled and controlled by the bridging subsystem. Important aspects to keep in mind:

- If eth0 physical link is down, wlan0 is the Primary Interface.
- If eth0 physical link is up, eth0 is the Primary Interface.

When eth0 link is up, wlan0 link is established, and the Bridging MAC Address is acquired (via pre-configuration or auto-detection), Bridging enters the Active state. If either link goes down, bridging falls back to the Inactive state.

When in the **Active** state, all packets that arrive on the wlan0 interface are bridged out the eth0 interface. Similarly, all packets that arrive on the eth0 interface are bridged out the wlan0 interface. However, exceptions to this behavior include:

- Ethernet packets directed specifically to the Ethernet (eth0) MAC Address are terminated internally and are not bridged to WLAN.
- ARP Requests for the Primary Interface's IP address are terminated internally and are not bridged to WLAN
- Ethernet packets which are not originated from the Bridging MAC Address are discarded

# Bridge Configuration

A bridge may be configured between an Ethernet interface and a WLAN interface. A bridge represents a relationship between the interface minor numbers. For example, br0 is a bridge between eth0 and wlan0.

***Table 13-1 Bridge Settings***

| WLAN Profile WPA & WPA2 Settings | Description |
|---|---|
| **State** | Enable or disable bridging. |
| **Bridging MAC Address** | Specify the MAC address of bridgeable traffic between the Ethernet and WLAN interfaces. When bridging is active, this MAC Address will be used as the MAC address of the WLAN interface. Packets received on the Ethernet interface from this address will be bridged to the WLAN interface (except traffic directed at the Primary Interface). If this field is not configured, then the device waits for the first packet to arrive on the Ethernet interface and uses the source address as the bridging address.<br>***Note:*** *if a Bridging MAC Address is not configured, then once it is obtained and configured dynamically, it remains in effect until a reboot.* |

## To View or Configure Bridge Settings

### *Using Web Manager*

- To view the Bridge status, click **Bridge** on the menu, select a particular bridge and click **Status**.
- To configure Bridge settings, click **Bridge** on the menu, select a particular bridge and click **Configuration**.

### Using the CLI

- To enter the Bridge command level: `enable -> config -> bridge 1` or `enable -> config -> bridge br0`

### Using XML

- Include in your file: `<configgroup name="bridge" instance="br0">`

# 14: Security in Detail

## Public Key Infrastructure

Public key infrastructure (PKI) is based on an encryption technique that uses two keys: a public key and private key. Public keys can be used to encrypt messages which can only be decrypted using the private key. This technique is referred to as asymmetric encryption, as opposed to symmetric encryption, in which a single secret key is used by both parties.

## TLS (SSL)

Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), use asymmetric encryption for authentication. In some scenarios, only a server needs to be authenticated, in others both client and server authenticate each other. Once authentication is established, clients and servers use asymmetric encryption to exchange a secret key. Communication then proceeds with symmetric encryption, using this key.

SSH and some wireless authentication methods on the PremierWave XN make use of SSL. The PremierWave XN supports SSLv2, SSlv3, and TLS1.0.

TLS/SSL application hosts use separate digital certificates as a basis for authentication in both directions: to prove their own identity to the other party, and to verify the identity of the other party. In proving its own authenticity, the PremierWave XN will use its own "personal" certificate. In verifying the authenticity of the other party, the PremierWave XN will use a "trusted authority" certificate.

In short:

- When using EAP-TLS, the PremierWave XN needs a personal certificate with matching private key to identify itself and sign its messages.
- When using EAP-TLS, EAP-TTLS or PEAP, the PremierWave XN needs the authority certificate(s) that can authenticate those it wishes to communicate with.

## Digital Certificates

The goal of a certificate is to authenticate its sender. It is analogous to a paper document that contains personal identification information and is signed by an authority, for example a notary or government agency. With digital certificates, a cryptographic key is used to create a unique digital signature.

## Trusted Authorities

A private key is used by a trusted certificate authority (CA) to create a unique digital signature. Along with this private key is a certificate of authority, containing a matching public key that can be used to verify the authority's signature but not re-create it.

A chain of signed certificates, anchored by a root CA, can be used to establish a sender's authenticity. Each link in the chain is certified by a signed certificate from the previous link, with

the exception of the root CA. This way, trust is transferred along the chain, from the root CA through any number of intermediate authorities, ultimately to the agent that needs to prove its authenticity.

## Obtaining Certificates

Signed certificates are typically obtained from well-known CAs, such as VeriSign. This is done by submitting a certificate request for a CA, typically for a fee. The CA will sign the certificate request, producing a certificate/key combo: the certificate contains the identity of the owner and the public key, and the private key is available separately for use by the owner.

As an alternative to acquiring a signed certificate from a CA, you can act as your own CA and create self-signed certificates. This is often done for testing scenarios, and sometimes for closed environments where the expense of a CA-signed root certificate is not necessary.

## Self-Signed Certificates

A few utilities exist to generate self-signed certificates or sign certificate requests. The PremierWave XN also has the ability to generate its own self-signed certificate/key combo. You can use XML to export the certificate in PEM format, but you cannot export the key. Hence the internal certificate generator can only be used for certificates that are to identify that particular PremierWave XN.

## Certificate Formats

Certificates and private keys can be stored in several file formats. Best known are PKCS12, DER and PEM. Certificate and key can be in the same file or in separate files. Additionally, the key can be either be encrypted with a password or left in the clear. However, the PremierWave XN currently only accepts separate PEM files, with the key unencrypted.

Several utilities exist to convert between the formats.

## OpenSSL

OpenSSL is a widely used open source set of SSL related command line utilities. It can act as server or client. It can also generate or sign certificate requests, and can convert from and to several different of formats.

OpenSSL is available in binary form for Linux and Windows.

To generate a self-signed RSA certificate/key combo:

```
openssl req -x509 -nodes -days 365 -newkey rsa:1024 -keyout mp_key.pem -
out mp_cert.pem
```

See www.openssl.org or www.madboa.com/geek/openssl for more information.

***Note:*** *Signing other certificate requests is also possible with OpenSSL but the details of this process are outside the scope of this document.*

## Steel Belted RADIUS

Steel Belted RADIUS is a commercial RADIUS server from Juniper Networks that provides a GUI administration interface. It also provides a certificate request and self-signed certificate generator.

The self-signed certificate has extension `.sbrpvk` and is in the PKCS12 format. OpenSSL can convert this into a PEM format certificate and key:

```
openssl pkcs12 -in sbr_certkey.sbrpvk -nodes -out sbr_certkey.pem
```

The `sbr_certkey.pem` file contains both certificate and key. If loading the SBR certificate into PremierWave XN as an authority, you will need to edit it:

1. Open the file in any plain text editor.
2. Delete all info before `"----- BEGIN CERTIFICATE-----"` and after `"----- END CERTIFICATE-----"`, and then save as `sbr_cert.pem`.

SBR accepts trusted-root certificates in the DER format. Again, OpenSSL can convert any format into DER:

```
openssl x509 -inform pem -in mp_cert.pem -outform der -out mp_cert.der
```

***Note:*** *With SBR, when the identity information includes special characters such as dashes and periods, SBR changes the format it uses to store these strings and becomes incompatible with the current PremierWave XN release. Support may be added for this and other formats in future releases.*

## Free RADIUS

Free RADIUS is another versatile Linux open-source RADIUS server.

# 15: Updating Firmware

## Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the unit from the Lantronix Web site (www.lantronix.com/support/downloads/) or by using anonymous FTP (ftp://ftp.lantronix.com/).

## Loading New Firmware through FTP

Firmware may be updated by sending the file to the PremierWave XN over an FTP connection. The destination file name on the PremierWave XN must be "firmware.rom". The device will reboot upon successful completion of the firmware upgrade.

Example FTP session:

```
$ ftp 192.168.10.127
Connected to 192.168.10.127.
220 (vsFTPd 2.0.7)
Name (192.168.10.127:user): admin
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> put premierwave_xn_7_3_0_0R9.rom
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
9308164 bytes sent in 3.05 seconds (3047859 bytes/s)
ftp> quit
221 Goodbye.
```

# 16: VIP Settings

## Virtual IP (VIP) Configuration

Configuring Connect Mode tunnels to use VIP is a simple matter of configuring a tunnel as is normally done, but also enabling VIP in the Tunnel Host settings, and using a VIP Name for the address.

VIP Accept Mode tunnels do not require special configuration. If VIP access is enabled (in VIP configuration), then VIP Accept Mode requests from a ManageLinx device will be accepted.

***Table 16-1 VIP Configuration***

| VIP Settings | Description |
|---|---|
| **State** | Enable (or disable) the VIP State to allow Virtual IP addresses to be used in Tunnel Connect Mode and to accept incoming Virtual IP connection requests to any local listening port. |

### To Configure VIP Settings

#### *Using Web Manager*

- To configure VIP settings, click **VIP** on the menu and select **Configuration**.

#### *Using the CLI*

- To enter the VIP command level: `enable -> config -> vip`

#### *Using XML*

- Include in your file: `<configgroup name="vip">`

## Virtual IP (VIP) Status

The VIP Status shows the current state of the conduit. When configured correctly, a conduit with the AccessMyDevice Gateway will be maintained at all times.

### To View VIP Status

#### *Using Web Manager*

- Click **VIP** on the menu and select **Status**.

#### *Using the CLI*

- To enter the VIP command level: `enable -> config -> vip, show status`

### Using XML

- Include in your file: `<statusgroup name=”vip”>`

## Virtual IP (VIP) Counters

***Table 16-2 VIP Counters***

| VIP Counters | Description |
|---|---|
| **Data Bytes** | Total bytes in the TCP packets (not the UDP packets) |
| **UDP Packet Queue** | The number of packets queued for transmission. |
| **UDP Packets** | The number of packets transmitted.<br>***Note:*** *UDP counts are packet based, and do not record the number of data bytes.* |

### To View VIP Counters

#### Using Web Manager

- Click **VIP** on the menu and select **Counters**.

#### Using the CLI

- To enter the VIP command level: `enable -> config -> vip, show counters`

#### Using XML

- Include in your file: `<statusgroup name=”vip”>`

# 17: Branding the PremierWave XN

This chapter describes how to brand your PremierWave XN by using Web Manager and Command Line Interface (CLI). It contains the following sections on customization:



## Web Manager Customization

Customize the Web Manager's appearance by modifying index.html, style.css, and the product logo. The style (fonts, colors, and spacing) of the Web Manager is controlled with style.css. The text and graphics are controlled with index.html. The product logo is the image in top-left corner of the page and defaults to a product name image.

***Note:*** *The recommended dimensions of the new graphic are 300px width and 50px height.*

The Web Manager files are hidden and are incorporated directly into the firmware image but may be overridden by placing the appropriate file in the appropriate directory on the PremierWave XN file system.

Web Manager files can be retrieved and overridden with the following procedure:

1. FTP to the PremierWave XN device.
2. Make a directory (`mkdir`) and name it `http/config` .
3. Change to the directory (`cd`) that you created in step 2 (`http/config`).
4. Save the contents of index.html and style.css by using a web browser and navigating to `http://<PremierWaveXN>/config/index.html and http://<PremierWaveXN>/config/style.css`.
5. Modify the file as required or create a new one with the same name.
6. To customize the product logo, save the image of your choice as `logo.gif` .
7. Put the file(s) by using `put <filename>`.
8. Type `quit`. The overriding files appear in the file system's http/config directory.
9. Restart any open browser to view the changes.
10. If you wish to go back to the default files in the firmware image, simply delete the overriding files from the file system.

# Short and Long Name Customization

You can customize the short and long names in your PremierWave XN. The names display in the CLI show command and in the System web page in the Current Configuration table. The short name is used for the show command. Both names display in the CLI Product Type field.

***Table 17-1 Short and Long Name Settings***

| Name Settings | Description |
|---|---|
| **Short Name** | Enter a short name for the system name. A maximum of 32 characters are allowed. |
| **Long Name** | Enter a long name for the system name. A maximum of 64 characters are allowed. |

## To Customize Short or Long Names

### *Using Web Manager*

- To access the area with options to customize the short name and the long name of the product, or to view the current configuration, click **System** in the menu.

### *Using the CLI*

- To enter the command level: `enable`

### *Using XML*

- Include in your file:

  ```
  <configitem name="short name">
  ```

  and

  ```
  <configitem name="long name">
  ```

# Appendix A: Technical Support

If you are unable to resolve an issue using the information in this documentation, please contact Technical Support:

**Technical Support US**

Check our online knowledge base or send a question to Technical Support at http://www.lantronix.com/support.

**Technical Support Europe, Middle East, Africa**

Phone: +33 13 930 4172
Email: eu_techsupp@lantronix.com or eu_support@lantronix.com

Firmware downloads, FAQs, and the most up-to-date documentation are available at http://www.lantronix.com/support

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number/MAC address
- Firmware version (on the first screen shown when you Telnet to the device and type show)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)
- Additionally, it may be useful to export and submit the exported XML Configuration file.

# Appendix B: Binary to Hexadecimal Conversions

Many of the unit's configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte).

The resulting binary value must be converted to a hexadecimal representation.

Use this chapter to learn to convert binary values to hexadecimals or to look up hexadecimal values in the tables of configuration options. The tables include:

- Command Mode (serial string sign-on message)
- AES Keys

## Converting Binary to Hexadecimal

Following are two simple ways to convert binary numbers to hexadecimal notation.

### Conversion Table

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, treat the upper and lower four bits separately to produce a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

### Scientific Calculator

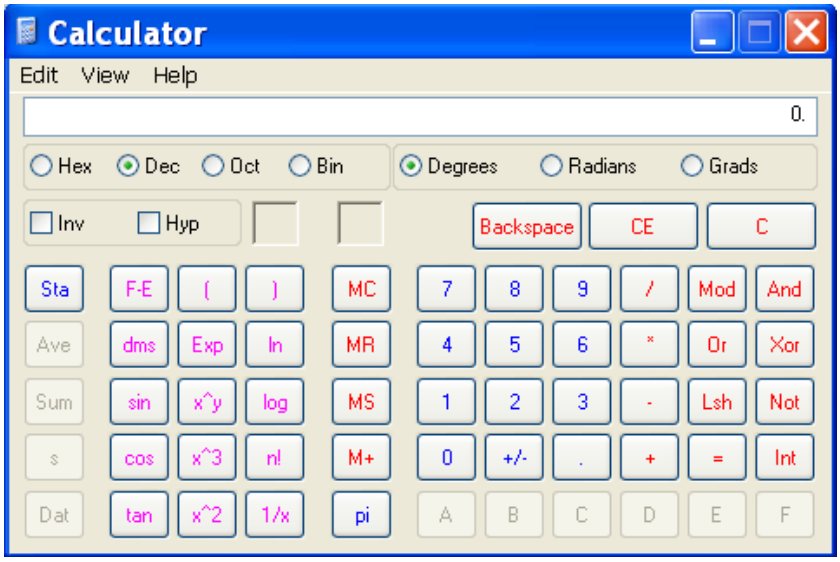
Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

1. On the Windows Start menu, click **Programs -> Accessories -> Calculator**.
2. On the View menu, select **Scientific**. The scientific calculator appears.
3. Click **Bin** (Binary), and type the number you want to convert.

***Table B-1 Binary to Hexadecimal Conversion***

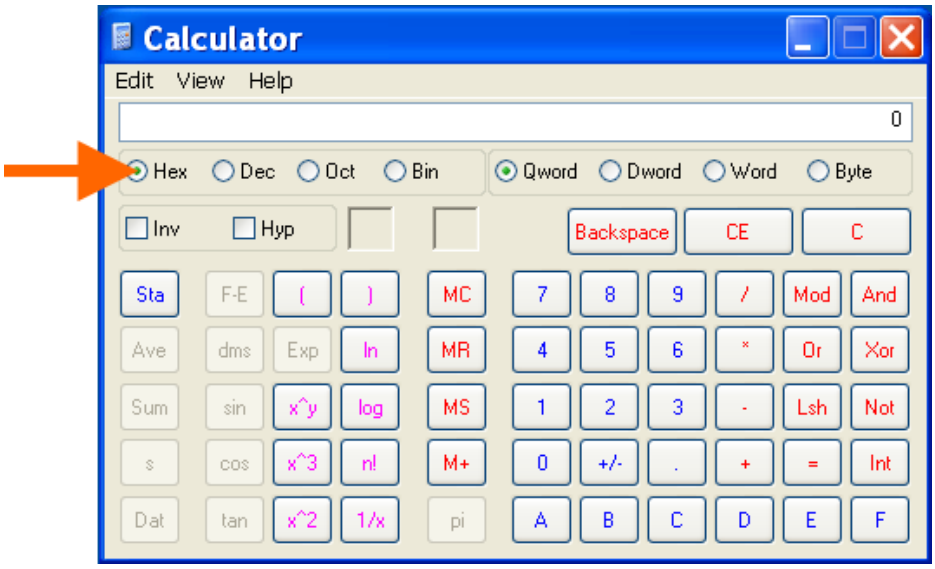
| Decimal | Binary | Hex |
|---|---|---|
| 0 | 0000 | 0 |
| 1 | 0001 | 1 |
| 2 | 0010 | 2 |
| 3 | 0011 | 3 |
| 4 | 0100 | 4 |
| 5 | 0101 | 5 |
| 6 | 0110 | 6 |
| 7 | 0111 | 7 |
| 8 | 1000 | 8 |
| 9 | 1001 | 9 |
| 10 | 1010 | A |
| 11 | 1011 | B |
| 12 | 1100 | C |
| 13 | 1101 | D |
| 14 | 1110 | E |
| 15 | 1111 | F |

**Figure B-2 Windows Scientific Calculator**




4. Click Hex. The hexadecimal value appears.

**Figure B-3 Hexadecimal Values in the Scientific Calculator**



# Appendix C: Compliance

(According to ISO/IEC Guide 17050-1, 17050-2 and EN 45014)

**Manufacturer's Name & Address:**

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA

**Product Name Model:**

PremierWave XN Device Server

Conforms to the following standards or other normative documents:

**Emissions**

- FCC Part 15 Subpart B
- Industry Canada ICES-003 Issue 4 February 2004
- CISPR 22: 2005 + A1: 2005 + A2: 2006 Information Technology Equipment
- VCCI V-3/2010.04
- AS/NZS CISPR 22: 2009
- EN 55022: 2006 + A1: 2007
- EN 61000-3-2: 2006 + A1: 2009 + A2: 2009
- EN 61000-3-3: 2008

**Immunity**

- EN 55024: 1998 + A1: 2001 + A2: 2003
- EN 61000-4-2: 2009
- EN 61000-4-3: 2006 + A1: 2008
- EN 61000-4-4: 2004 + A1: 2010
- EN 61000-4-5: 2006
- EN 61000-4-6: 2009
- EN 61000-4-8: 1994 + A1: 2001
- EN 61000-4-11: 2004

Uses PremierWave XN module with the following:

- FCCID: R68PEN
- ICID: 3867A-PEN
- Japan-approved transmitter IDs: 006XWA0019, 006YWA0009, 006WWC0244

**Safety**

- IEC/EN 60950-1, UL

**Manufacturer's Contact:**

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-450-7249

**RoHS Notice**

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

| Product Family Name | Toxic or hazardous Substances and Elements | | | | | |
|---|---|---|---|---|---|---|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr (VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
| DSC | 0 | 0 | 0 | 0 | 0 | 0 |
| EDS | 0 | 0 | 0 | 0 | 0 | 0 |
| IntelliBox | 0 | 0 | 0 | 0 | 0 | 0 |
| MatchPort | 0 | 0 | 0 | 0 | 0 | 0 |
| Micro | 0 | 0 | 0 | 0 | 0 | 0 |
| MSS100 | 0 | 0 | 0 | 0 | 0 | 0 |
| PremierWave | 0 | 0 | 0 | 0 | 0 | 0 |
| SCS | 0 | 0 | 0 | 0 | 0 | 0 |
| SecureBox | 0 | 0 | 0 | 0 | 0 | 0 |
| SLB | 0 | 0 | 0 | 0 | 0 | 0 |
| SLC | 0 | 0 | 0 | 0 | 0 | 0 |
| SLP | 0 | 0 | 0 | 0 | 0 | 0 |
| Spider and Spider Duo | 0 | 0 | 0 | 0 | 0 | 0 |
| UBox | 0 | 0 | 0 | 0 | 0 | 0 |
| UDS1100 and 2100 | 0 | 0 | 0 | 0 | 0 | 0 |
| WiBox | 0 | 0 | 0 | 0 | 0 | 0 |
| WiPort | 0 | 0 | 0 | 0 | 0 | 0 |
| xDirect | 0 | 0 | 0 | 0 | 0 | 0 |
| xPico | 0 | 0 | 0 | 0 | 0 | 0 |
| XPort | 0 | 0 | 0 | 0 | 0 | 0 |
| XPress DR & XPress-DR+ | 0 | 0 | 0 | 0 | 0 | 0 |
| xPrintServer | 0 | 0 | 0 | 0 | 0 | 0 |
| xSenso | 0 | 0 | 0 | 0 | 0 | 0 |

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.